THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LX. No. 1525.] LONDON, AUGUST 2, 1892. [44TH YEAR. PRICE 6d.

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See Advt. p. III., centre of JOURNAL.

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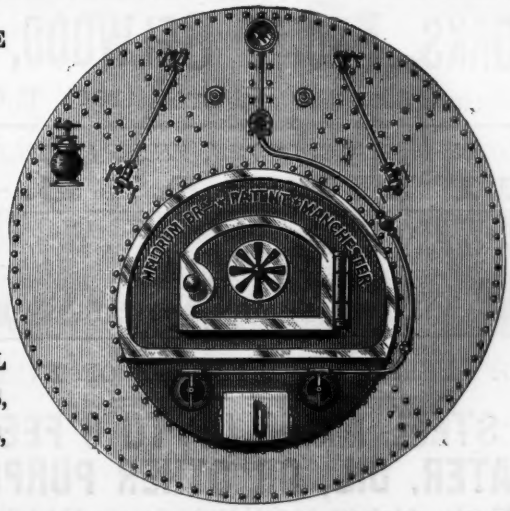

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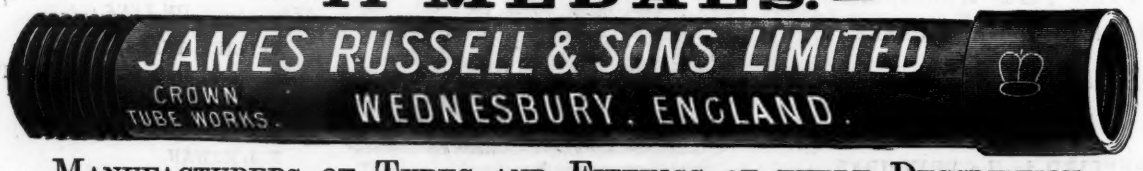

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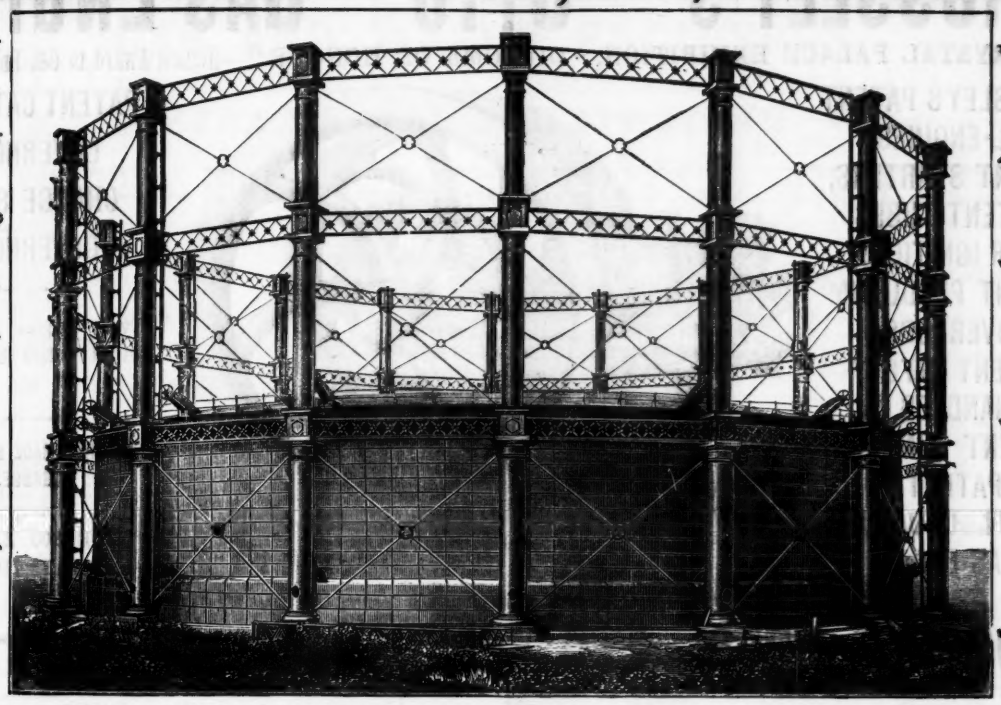

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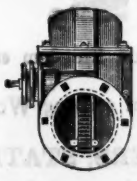

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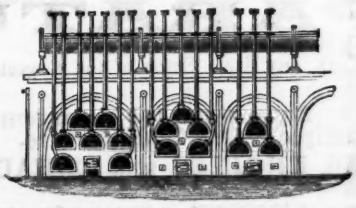

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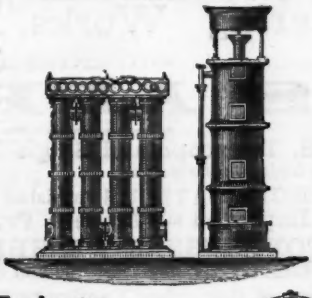

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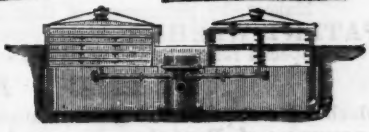

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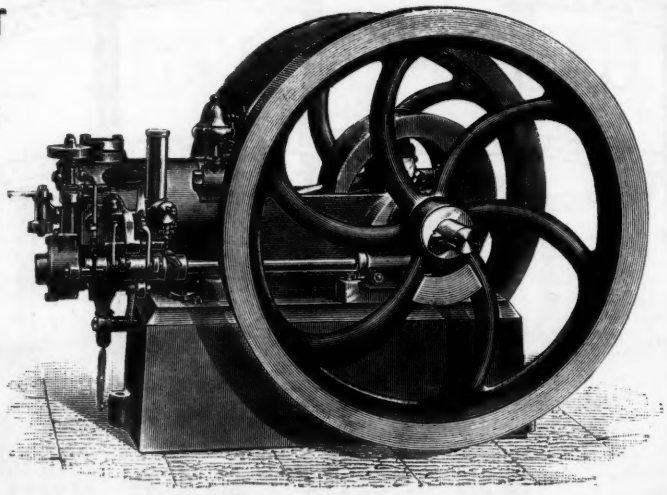

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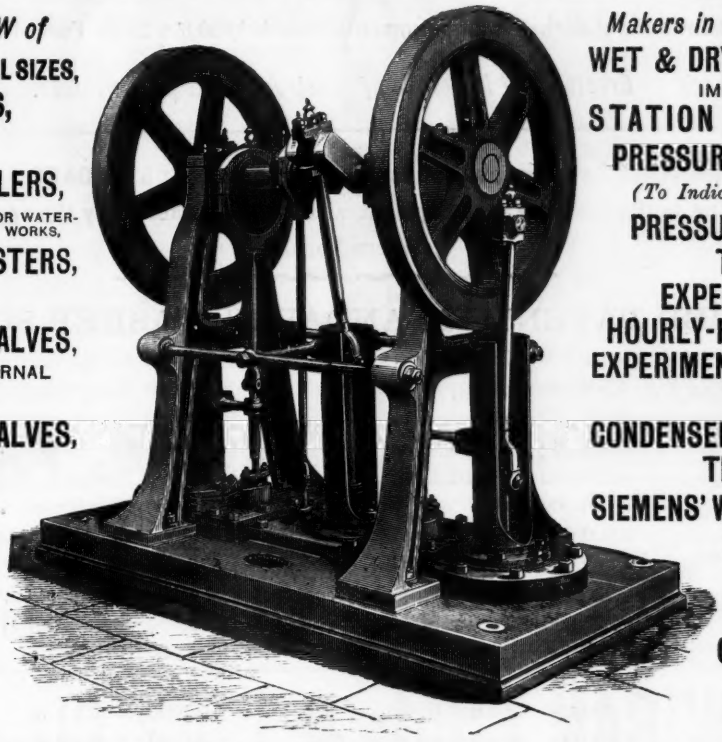

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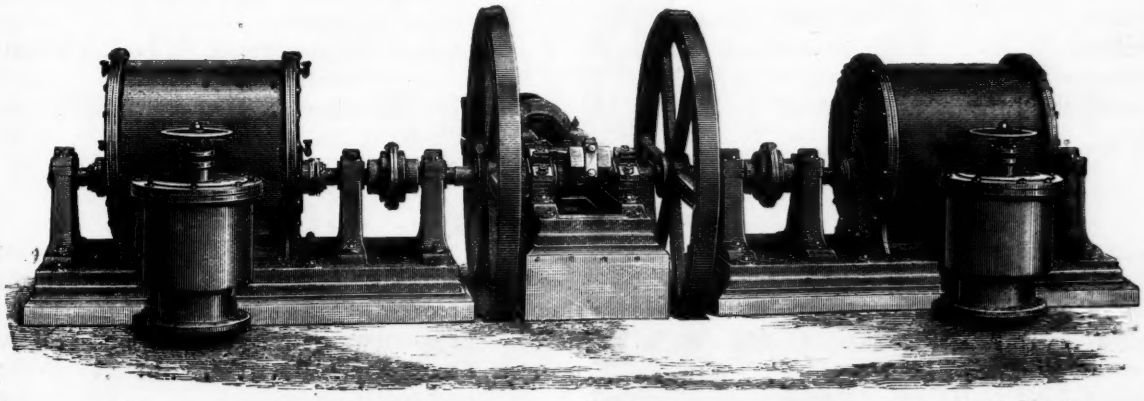

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Kensal Green	3,000,000	Cambridge	1,000,000	Lowestoft	500,000
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Croydon	3,000,000	Valencia (Spain)	875,000	St. Chamond (France)	350,000
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Glasgow	2,500,000	Altoona (U.S.A.)	750,000	Melun ,,	210,000
,,	2,500,000	Smethwick	750,000	Valencia (Spain)	200,000
Manchester	2,500,000	Schneider-Creusot Works		,, ,,	200,000
Leicester	2,250,000	(France)	735,000	Vercelli (Italy)	200,000
Swansea	2,000,000	Valparaiso (Chili)	600,000	Rawmarsh	200,000
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Charlottenburg (Germany)	1,500,000	,, ,,	600,000	Sydney	100,000
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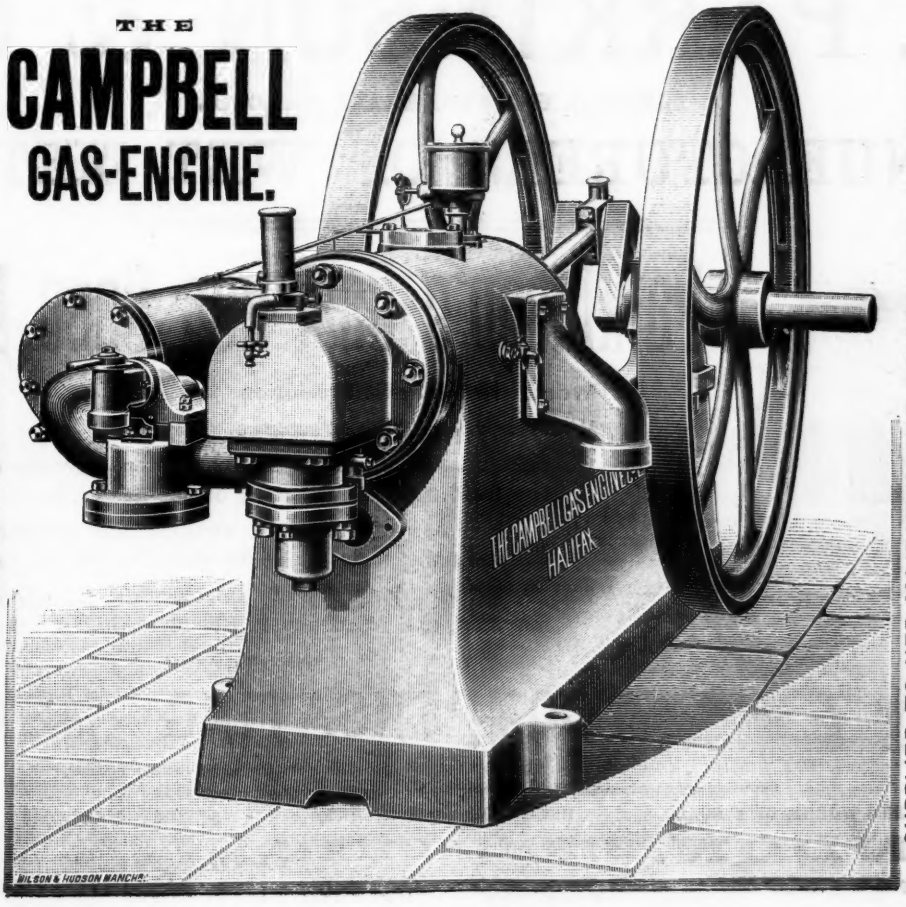

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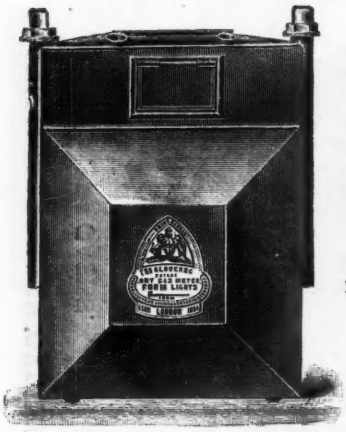

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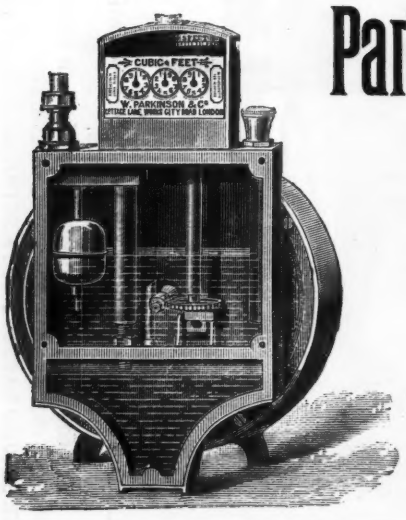

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Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

Unexcelled for Simplicity of Construction, Excellence of Workmanship, and Accuracy of Registration.

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TO ADVERTISERS.

ADVERTISEMENTS for the next number of the JOURNAL must be received by Monday, 12 o'clock noon, to ensure insertion; but Orders for Alterations in or Stoppages of PERMANENT ADVERTISEMENTS should be received Not Later than the FIRST POST on SATURDAY.

TO CORRESPONDENTS.

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Telegraphic Address: "GASKING LONDON."

Telephone Number: 2759.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 2, 1892.

The Report and Accounts of The Gaslight and Coke Company.

THE report of the Directors and the accounts relative to the last half-year's working of The Gaslight and Coke Company have been issued; and the ordinary general meeting is to be held on Friday. As already announced, the amount of profit made is sufficient to enable the Directors to recommend a dividend after the statutory rate of 12 per cent., and to carry forward the sum of £21,783 as an undivided balance. The profit upon the six months' working is £350,032, which is to be compared with the balance of £195,746 of the corresponding period of last year—a sufficiently remarkable change of circumstances, in accounting for which the advance in the price of gas from 2s. 9d. to 3s. 1d. per 1000 cubic feet must be duly considered. The report goes on to state that the abnormal rise of 9·55 per cent. in the increase of gas sales for the first half of 1891 has been compensated for by a decrease of nearly 3 per cent. for the last six months; the average increase for the two half years being, therefore, 3¼ per cent., "which is nearly the normal rate taken over a series "of years." This check in the recent development of the undertaking is wholly ascribed in the report to there having been "hardly any fog, and but little frost and cold," in the period under review; but we shrewdly suspect that the increased price of gas has had more to do with the result than the Directors care to admit. They remark upon the Durham strike, which caused them to buy coal elsewhere at an extra cost of £10,437. This statement is to be commended to the consideration of Durham miners' leaders. By the kindness of the Official Auditor (Mr. Allen Stoneham), this extra outlay has been treated as of the nature of insurance, and charged to the appropriate fund —an arrangement as convenient as it is, doubtless, legal.

Then comes an important announcement, which deserves to be discussed separately from the rest of the report. It is a declaration that, in the opinion of the Directors, the supply of so-called cannel gas of 20-candle power in the district hitherto reserved for this class of the Company's business must cease, and that the ordinary 16-candle gas must take its place. It is explained that this course has become necessary "owing to the scarcity, and consequent "prohibitive price, of high-class cannel coal." It is further observed that "the increasing use of gas for fuel "has rendered a highly illuminating and expensive gas "unsuitable to the present day requirements of London; "while the improvements in gas-burners have tended to "raise the efficiency of 16-candle gas, which will hence-"forward be the only gas supplied by the Company." The change is to take effect from the 30th of September next; and it is remarked that it has been welcomed by the consumers in the district affected. For many reasons the Company are to be congratulated upon the proposed step. Their obligation to supply two qualities of gas has been an anomaly, of which they will be well quit. It has brought more confusion than profit into the working of the undertaking; and while it is inconceivable that any consumer will suffer from the alteration, it is certain that many will benefit in a variety of ways. The policy thus enunciated is of some technical interest, moreover, inasmuch as it appears to indicate that the Company's experiments with water gas, &c., do not lead to the conclusion that there is any hope for a high-power gas for London.

The report further announces that the effect of the recent rating appeals of the Company has been a reduction of their assessments "equal to a saving in parish "rates of about £10,000 per annum for the next five "years;" but it does not quote, as a set-off, the expenses of the appeals, which might possibly have been saved if the Company had manifested a less uncompromising attitude from the first. Additional "A" stock to the amount of £150,000 is to be issued as required, to pay for extensions of works and plant. Nothing is said about any expansion of the demand for gas for cooking and heating, which has usually come in for some remark.

Turning now to the revenue account, in search of support for the statements contained in the report, it will be seen that the receipts for gas rose from £1,242,321 in the first half of 1891, to £1,352,570. The difference is wholly derived from the increase of price, as the gas accounted for has *fallen* from 10,024,416,000 cubic feet to 9,734,884,000—a progress in the wrong direction which it is impossible to regard with satisfaction. Stove and meter rentals, however, still show some increase; so that there are grounds for trusting that the check in the demand for gas may prove to be of a temporary character. Residuals are bad. Coke has fallen from £313,338 to £217,349; breeze, from £7591 to £4982; tar, from £121,484 to £82,092; and ammonia, from £82,667 to £73,188. The only gleam of satisfaction to be obtained from these figures is in the reflection that, in the circumstances, coal cannot remain dear. Notwithstanding the increased price of gas, the gross revenue for the half year has dropped from £1,928,649 to £1,893,654. On the other side of the accounts occur some notable decreases. Coal has fallen from £902,074 to £746,341; wages (carbonizing), from £193,394 to £169,582; and purification, from £45,362 to £36,178. The pruning-knife has been used in other departments; but these are

the principal outlets for cash, and they have been sharply dealt with. How much of the credit for better working may be traceable to the administrative changes effected last autumn, we cannot say; but praise should be allotted where it is due. Just one word upon the subject of the carbonizing returns. While the consumption of cannel has hardly altered, and that of coal has considerably fallen off, there has yet been a greater employment of oil, if we read the figures aright. This should be explained.

On the whole, there is not so very much for Colonel Makins, the Governor of the Company, to talk about on Friday. He has triumphantly proved that the remedy for unprofitable trading is to put up the price of the commodity, from which the proprietors may extract as much consolation as they can get. He will have to clear up the awkward consequences of his *maladroit* treatment of Sir Frederick Mappin, M.P., six months ago, and his singular misstatement with regard to the price of gas at Cambridge. He will probably be more careful how he takes the responsibility for all that his too-zealous henchmen put into his mouth when he is "heckled" from the body of the hall. *Noblesse oblige;* and the head of the largest gas undertaking in the world cannot afford to be known as loose in his facts, unless he is prepared to wreck his own credit and that of the undertaking of which he is the mouthpiece. In conclusion, we regret that it is impossible to congratulate The Gaslight and Coke Company upon their progress; but we do so most sincerely upon their economies.

The Meeting of the North British Association.

The North British Association of Gas Managers met at Stirling last week under the presidency of Mr. MacPherson, of Kirkcaldy, the full text of whose Inaugural Address appears in another column. The meeting was favoured with fine weather, and was well attended by the members and friends of the Association. The presidential address, being the second effort of the kind which Mr. MacPherson has been called upon to make in the interest of the Association, is excusably general in character. It dealt eloquently, as was to have been expected, with the cause of the Murdoch Commemoration—which constituted the special glory of the meeting. As Mr. MacPherson declared, Scotsmen have a right to be proud of their truly great countryman; and if the shade of the departed worthy was permitted to take cognizance of these memorial proceedings, it is hardly too much to hope that he, in turn, would be satisfied with what his followers are doing to keep his name and fame fresh upon the earth. The proceedings connected with the placing of the Murdoch bust in the Wallace Monumental Hall are recounted elsewhere; suffice it to say here that the simple but dignified ceremony was pleasingly performed. The papers read at the meeting were quite up to the usual standard of quality, and numerous enough to fill the time available for this portion of the business. The President for the ensuing year is Mr. T. D. Hall, of Montrose; and the next place of meeting will be Dundee. The energetic Secretary and Treasurer (Mr. R. S. Carlow, of Arbroath) is continued in office. The Association maintains its character for holding instructive and agreeable gatherings; and it is to be hoped that the day may be far distant when we shall be required to chronicle a decadence in either respect. It would not be fair to conclude a notice of the Murdoch Centenary Meeting of the Association without signalizing the indebtedness of the members to Mr. James M'Gilchrist for his devotion to the cause of this memorial; and this obligation was recognized by the members agreeing to present him with an oil-portrait of himself, as an acknowledgment of his services in this regard.

Mr. B. H. Thwaite Replies.

It would be affectation to pretend to be surprised at the effect which our candid comments upon Mr. B. H. Thwaite's Birmingham fuel-gas project have had on this ingenious gentleman. He is much upset, particularly at being charged with having wrapped up this notable scheme in "a mass of superfluous verbiage;" and he defends himself in a letter of portentous length which will be found in another column, or columns. We venture to suggest that the question whether a writer does or does not indulge in superfluous verbiage, is a matter of taste; and as such we are perfectly free to treat it, whether with reference to the writings of Mr. Thwaite or of anybody else. Presumably no writer is conscious of his own defects of style, or he would endeavour to cure himself; and so far from being angry with us, Mr. Thwaite ought to be grateful for a correction which may yet do him good in the future. We fear, however, that he is not at present in a mood to receive any correction. Like many other people, when met with opposition he straightway cries out for "impartial" treatment—by which he means treatment partial to himself. Trade Union workmen have a similar trick of language, for what they call a "fair "house" is an establishment regulated according to their own wishes; while an "unfair house" means merely a place where business is not carried on under Trade Union dictation. It is possible that we may offend Mr. Thwaite still further by declining to take his letter paragraph by paragraph, and argue with him thereon. It is for him to prove his scheme to be feasible; and it would not really help him in this task if we conceded him a mere dialectical triumph. We shall certainly not withdraw a single word we have uttered against his project until he has proved, by incontestable evidence, that our objections are unfounded; but then we will do so in such terms as shall make his victory shine all the brighter. The letter contains one assertion which we must question. Mr Thwaite says that "there has not been any precedent for "the distribution of cheap low illuminating and fuel power "gas (except of the natural character at Pittsburgh) for "motive power and domestic and industrial heating "purposes." If Mr. Thwaite had read his Journal carefully during the past few years, he surely could not have ventured upon a statement like this. As a matter of fact, several such experiments have been made in the United States; and if Mr. Thwaite would read up our references to, and comments upon them, he might perhaps learn more about the commercial side of fuel-gas distribution than he appears to know at present.

Unsafe Lamps.

An attempt has been made, by means of a letter published in several newspapers, to interest parliamentary candidates in the truly burning question of the dangerous character of the common run of petroleum-lamps sold throughout the United Kingdom. It remains to be seen whether this attempt, which is both well-meant and well-timed, will have any positive results in the shape of legislation. Unhappily, there is no difficulty in getting up a strong case against the oil-lamps which constitute the only means of lighting used by a large proportion of the population in town and country. Unregulated competition has resulted in the production of many descriptions of good lamps, against which there is little to be urged in the interest of public safety; but the same influence, operating in another direction, has also flooded the market with abominable contrivances of the lamp species, which are, to all intents and purposes, more deadly than the average Anarchist's bomb. Not all the misdirected ingenuity of the Nihilists and Fenians has actually done so much mischief to life and property as may be ascribed to rubbishy petroleum-lamps. But the inconsistency of humanity is such that, whereas the discovery of a so-called "infernal "machine" made out of a piece of gas-pipe suffices to throw a whole community into a state of the utmost nervous agitation, vanloads of trashy oil-lamps, of which a definite proportion are certain to bring death and destruction into unsuspecting households, are sent into our towns every day, and nobody takes any notice. The dangerous nature of the oil that is to be burnt in these lamps is recognized, and precautions are taken to reduce this danger to a minimum; but the lamp itself, which is to the oil as ordnance is to ammunition, is quite overlooked by statute. It may well be asked how much longer this condition of affairs is to be tolerated. Perhaps the next Parliament may be so hampered in the Party sense by the equality of factions as to be incapacitated from dealing with those noisy questions which mostly fill political orations and newspaper columns; and, in this event, some of the more immediately useful projects of legislation, such as this of the regulation of the lamp trade, which are continually shelved by Parliament after Parliament in favour of more showy programmes, may receive the attention they undoubtedly merit at the hands of statesmen properly solicitous for the protection of the people in their homes.

Strikers, Anarchists, and the Law.

It is not at all surprising that the course of the labour war at Pittsburgh should be followed with keen interest by the newspaper-reading public of both hemispheres. The

incidents of this struggle, as reported since we commented upon the outbreak of hostilities, go to confirm what we have remarked upon the folly as well as the wrong committed by those who break the common law for the sake of gaining an immediate selfish advantage. It appears to us that this lesson of the sacredness of law is that which the organizers of labour parties everywhere need most urgently to learn just now. Unfortunately, they do not appear to realize this necessity. Intelligent as many of them doubtless are, our labour agitators do not seem to be able to distinguish between the cause of law and order and what they regard as the cause of their supposed enemies, the "capitalists." In a recent number of the *Workman's Times*, we notice an article dealing with the Pittsburgh strike, in which the writer observes, with regard to the arrangements made by the United States Government for the repression of rioting and violence, that "Carnegie's gospel of wealth is to be preached, if neces-"sary, with a running accompaniment of gunpowder." So long as those who set themselves up as teachers of the labouring population wilfully indulge in this sort of misrepresentation, they must be regarded as no better than apologists for anarchy. The doctrine that a proposed reduction of wages can be justifiably met by rioting, arson, and murder must be abandoned by those who presume to speak in the honourable name of Labour, before they can be reasoned with as law-abiding citizens of any civilized nation. The result of law-breaking by the Homestead strikers is shown by the lurid incident of the murderous assault upon Mr. H. C. Frick, the Manager of the works, by the Russian Anarchist Berkman. This illustration of defiance of law in the concrete is reported to have greatly depressed the leaders of the strikers; and no wonder. Like the assault upon Mr. Gray, at Silvertown, and the Hyde Park threats against the life of Mr. G. Livesey, the incident goes to show with what sort of company those who break the law "on principle" must be prepared to identify themselves. When the German Socialists who had been talking philosophic anarchy for years were shocked by a well-remembered attempt upon the life of the late Emperor William, they were told by Prince Bismarck that the criminal "clung to their "skirts." So now it is not the "capitalist" who is in reality the worst enemy of the Labour Party, but the murderous Anarchist who thinks he is putting preaching into practice when he "removes" individual employers. Our demagogues lay great stress upon the employment of Pinkerton's men by the managers of the Homestead Works; but this step was notoriously resorted to only when the local police force had been declared powerless to keep the peace. It is altogether beyond the grasp of the average agitator that the solitary policeman represents the supremacy of the law just as perfectly as an army corps. In ordinary circumstances, a single policeman is enough to vindicate the majesty of the law for a whole country parish; but let other conditions arise, and the Executive of the country will supplement the policeman with a brigade, if necessary. If the matter were not so very serious, it would be ludicrous to remark how the same party of the community that protests loudest against what its leaders call the unwarrantable interference of the State in disputes between employers and employed, will fly to the same source of power for their own purposes. The other day, at the Liverpool Police Court, an Assistant Secretary of the Dockers' Union was charged with having embezzled £40 of the Society's funds. Why was the strong arm of the law set in operation against this man, if everybody is free to pick and choose the laws which he will condescend to obey? If some of our Fabians and Social Democrats would consider this question, instead of uttering pernicious balderdash about the iniquity of making the State play the part of "blackleg brigadier," they might gain wisdom respecting some highly important matters which they have hitherto overlooked.

The Appeal in the Gadd Case came before Lords Justices Lindley, Lopes, and A. L. Smith, yesterday; and the arguments were proceeding when the Court rose. The action, it will be remembered, was tried by Mr. Justice Kekewich at intervals from March 29 to May 4 last, when the Attorney-General (Sir R. E. Webster, Q.C., M.P.) replied for the plaintiffs, and his Lordship reserved judgment. This was given, adversely to Messrs. Gadd and Mason, on May 26; and an appeal therefrom was promptly determined upon.

WATER AND SANITARY AFFAIRS.

THREE long articles on "The Water Supply of London" have now appeared in *The Times;* the aggregate length verging closely on eight columns. The bulk of a tolerably large pamphlet is thus before us; and it must be acknowledged that the writer is evidently well acquainted with his subject, though his knowledge is affected by a certain bias. The grand conclusion arrived at in these articles has reference to an apprehended deficiency in the amount of the supply. Quality is made the basis of certain objections; but stress is specially laid on the question of quantity. It is declared "absolutely essential that steps should be taken "to secure an adequate guarantee that a sufficient supply "shall be forthcoming." This may be granted; but where is the "adequate guarantee" to be found? Have the Water Companies confessed themselves unable to carry out their statutory obligations after a certain date? If they have not spoken explicitly on this point, it is to be hoped they will soon do so. But actions speak louder than words; and the Companies have all along bestirred themselves to keep up a supply fully equal to the demand. The writer in *The Times* says the required guarantee "could not have been given by the Companies "at any time," to which it is added that "it certainly "cannot be given by them now." Why not now? The reason assigned is of a very significant character. It is that we have reached a crisis when the Companies "are, "for all practical purposes, prohibited from extending "their operations, *or from doing anything calculated to increase* "*the cost of the undertakings* which the public, through the "instrumentality of some representative body or another, "is certain to acquire." The italics are our own; but we would ask our readers carefully to consider what this passage means. It signifies that the policy enforced against the Grand Junction Company in the case of the Dorney scheme is to be employed against all the Metropolitan Water Companies. They are to be checked and hindered in any endeavour they may make or propose for the enlargement of their resources; and being thus crippled, there will be the better chance to prove that London has outgrown the ability of the Water Companies to give a sufficient supply. Neither are the Companies to spend money, lest the public should have to repay them. That money will have to be spent, and that on a large scale, is a foregone conclusion. But—so it is argued—the Companies must not be allowed to do this. It must be undertaken by "some representative body;" and the cost of the proceeding is to be relieved by a reduction in "the present value of the undertakings of the Water "Companies." This is justified on the plea that if the Companies were allowed to remain undisturbed, "they "would be face to face with a costly and obligatory "enterprise." Why not let them face it, if they will? Because it is thought better to let the expenditure be undertaken by the "representative body" than by the Companies. "Not because the total cost to the public "will be less," but because "less of the money which "must be expended will go into the pockets of the share-"holders in the Water Companies." How generous, and how logical! The money "expended" goes "into the "pockets of the shareholders," concerning whom the writer suggests that they have already had "their full "share of profit from the public." It is difficult to follow this devious argumentation; but we want to know where the responsibility is henceforth to rest for the maintenance of the efficient water supply of London. The Companies are to have their hands tied behind their backs, a new and distant source of supply is to be sought, a fresh scheme is to be devised and submitted to Parliament, and extensive works are ultimately to be carried out. The late Deputy-Chairman of the County Council reckoned that all this would take about fifteen years. What is to become of London in the meantime? The present sources are not to be extended, and the new source is to be fifteen years distant. In the interim, we suppose the Companies are to come to the rescue, aided by that supply from the chalk which, though objected to as insufficient, is nevertheless so good, so abundant, and capable of such development, that it is to be kept in reserve as something to fall back upon in case the new works, when finished, should break down. If the writer in *The Times* is shadowing forth a policy entertained in high quarters, we can but pronounce it as singularly

crude as well as unjust, faulty in conception, and injurious to the interests it pretends to promote. With respect to the "costly and obligatory enterprise" which the Companies are to face, in providing an adequate supply for a greatly increased population, a letter from Colonel Makins in *The Times* of yesterday points out that Parliament is not likely to impose such an obligation without conferring power to raise the necessary capital.

The sale by auction of an Adventurer's share in the New River Company last week exhibited a result capable of only one explanation, such as we find in the editorial "Notes" of the *St. James's Gazette*. Three years ago a similar share was purchased by the Prudential Assurance Company for £122,800. The price now realized is only £106,000, notwithstanding the increasing income derived from the water-rental, and the nearer approach of the time when certain valuable leases which belong to the New River Company will fall in. Our contemporary just named remarks that purchasers are most likely "afraid of the London County Council and the "Radical majority in Parliament." "The mere suspicion," it is added, "that the Progressive party may some day "embark on a policy of confiscation, may make investors "feel nervous." Sir T. Farrer, after his manner on a former occasion, will perhaps rejoice that in this particular instance the great municipal body which he "adorns" has knocked down the value of a water share by as much as 14 per cent. We would, however, suggest that the depreciation is unreasonable, and is the mere result of a scare, though we admit that the cause is palpable enough; while at the same time it is far from creditable to a public body that it should be associated in any degree, present or prospective, with a "policy of confiscation." But in all this agitation about terms of purchase, it should be remembered that the County Council are simply seeking to frighten the Water Companies into parting with their property at a price below its real value. Shareholders must be firm, or they will play into the hands of the enemy. The "policy of confiscation" is not bound to succeed; and even a "Radical majority in Parliament" may not furnish a majority capable of accomplishing all the desperate things which are talked about. Messrs. Fox and Bousfield, in a letter written on Saturday, take a cheerful view of the situation, and signify that the Prudential bargain was a high one, induced by exceptional circumstances.

We referred last week to the second vote of £250 by the London County Council, towards defraying the cost of the investigation now being conducted by the Royal Society respecting the vitality of microscopic pathogenic organisms in water. Dr. Percy Frankland and Professor Marshall Ward are engaged in this investigation; and a copy of their first report to the Water Research Committee of the Royal Society is now before us. At the commencement of the report there is an interesting review of the progress of the germ theory of zymotic disease, especially in relation to Koch's method of gelatine-plate culture, and subsequent improvements thereon. It is by this process we have the means of estimating the number of living germs present in a given quantity of any material. On the Continent, and especially in Germany, it was speedily assumed that the relative number of microbes present in different waters afforded evidence of the extent to which these waters had been contaminated. More caution and reserve were exercised in England; and in 1885 it was discovered, both here and abroad, that many forms of micro-organisms could multiply to an astonishing extent in waters of great organic purity, including distilled water itself. Another topic was furnished by the effect of various processes of purification on the bacterial life present in the water. By means of the gelatine-plate test, the value of a number of filtering materials has been ascertained, "and the remarkable efficiency of water-works "sand-filtration for the first time established." It has also been shown that in the subsidence of solid particles it often occurs that "a surprisingly large proportion" of the micro-organisms present in water are carried to the bottom. This has its bearing on the question of storeage reservoirs. Another use to which the bacteriological methods have been applied is the distinct discovery of pathogenic microbes in water. The spirillum of Asiatic cholera was early discovered by Koch; while the bacillus of typhoid fever has been more recently detected by various investigators. Direct experiments on the vitality of known pathogenic organisms are peculiarly liable to error. But it is declared to be sufficiently evident that some pathogenic species, especially those which form spores, are capable of retaining their vitality in ordinary potable waters for a long period of time—in some cases several months; while other forms, especially in the absence of spores, are very rapidly destroyed. A remarkable circumstance—though we are cautioned as to possible error—consists in the more rapid destruction of pathogenic forms when introduced into unsterilized waters, than when the same forms are introduced into the same waters after the latter have been sterilized. This result, if it is to be relied upon as a fact, is accounted for by assuming that, in the case of the unsterilized water, the pathogenic forms perished in the struggle with the other microbes, which, of course, must have been non-pathogenic. "Competing forms" limit the duration of cholera spirilla. Yet cholera germs have been found in water seven months after infection. But this cannot be a general rule; for one of the conclusions is that, in the case of ordinary water, with rare exceptions, the pathogenic forms "die out sooner or later, with or without pre-"vious temporary multiplication." It is perfectiy clear, as stated by Dr. Percy Frankland's father before the Royal Commission on Water Supply, that we have much to learn with regard to the presence of microbes in water; and the need for further knowledge gives especial value and importance to the investigation now going forward under the auspices of the Royal Society.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 218.)

THE Stock Exchange last week was quite devoid of any special characteristic. The chief business in hand was the settlement, which was a light one, and was carried through without difficulty. All markets were quiet and inanimate; and prices scarcely moved at all either way. There is no likelihood of anything galvanizing them into life and activity now; and in all probability things will remain more or less in their present state of torpor until after the autumn recess is concluded. The Money Market shows no change; and the 2 per cent. rate which has just completed the third month of its existence looks strong enough to last a good while longer. The Gas Market has been moderately active, considering the general tendency the other way, and is firm and steady. Changes in quotations are fairly numerous; and all are in the upward direction with the exception of one or two minor stocks, which have suffered a slight relapse. In Gaslights, the "A" opened a point stronger, with business done at 224. This figure was later on nearly, but not quite, attained again; and the final mark was about 222. The other issues, debenture, preference, and limited, were all in good demand, and scored advances of from 2 to 3 per cent. The accounts of the Company (which are discussed in another column) were regarded as satisfactory, considering the extremely unfavourable circumstances of the period in regard to both the purchase of coals and the sale of residual products. Business in South Metropolitans was extremely limited, and the price continues to move up. Commercials were not dealt in. Among the Suburban and Provincial Companies there is a slight fall in Alliance and Dublin; but Brentford is higher. The accounts of the Company show that the circumstances of the half year already referred to have rendered the profits insufficient, apparently by about £12,500, to meet the requirements of the dividend; thus necessitating an advance in the price of gas next Michaelmas. The Continental Companies have made further advances in value. Among the rest, the only change is a fall of ½ in Monte Video. Water has been quiet, and is steady for the most part, though Southwark ordinary is 1 lower.

The daily operations were: The Gas Market opened firm on Monday, though very little business was done except in Imperial Continental. Brentford old rose 3; Gaslight "A," 1; "C," "D," and "E," 3; "J," 2; and 6 per cent. debenture, 2. Transactions were still restricted on Tuesday, and nothing stirred except Imperial Continental, which rose 1. Gaslight "A" was more active on Wednesday, at firm figures; South Metropolitan "B" rose 2; and Imperial Continental, 1½. Alliance and Dublin fell ½. On Thursday there was nothing to note except an advance of ½ in European (part paid). Southwark and Vauxhall ordinary fell 1. Friday was quiet; but everything maintained its firmness except Monte Video, which relapsed ½. Saturday was equally inactive; and all quotations closed without further change.

ELECTRIC LIGHTING MEMORANDA.

A Slight Difference of Opinion—A Question of Performance—The Condition of the Electrical Trades—English Electricians and the Chicago Exhibition.

IT is not often that we find ourselves in disagreement with our electrical contemporaries; for as a rule these publications, or at any rate the most respectable of them, are conducted as care-

fully in the interests of truth as is the JOURNAL. We never find fault with them for putting the best side of their case forward, for this is their proper business; and they do not grumble with us for diligently exhibiting the shady side of electric lighting. We are, however, compelled to enter a protest against the manner in which the *Electrician* has dealt with the subject of the present position of the central station electric lighting industry in London, as compared with the gas supply. As recently explained in our columns, the *Electrician* published an article giving an estimate of the year's business of the central station companies, and stating this as a percentage upon one half-year's output of gas of The Gaslight and Coke Company. We characterized this as a "ridiculous blunder;" and the aspersion is greatly objected to by our usually correct contemporary, which returns to the subject with an indignant disclaimer of any intention to deceive, admitting that the sentence in which the comparison is made it "ambiguous," but claiming that the context exonerates it from any other cause of reproach. We accept the apology, such as it is; but must insist upon the contention that it is a ridiculous blunder on the part of any statistician to take a whole year's transactions of one industry and work this out as a ratio upon a half-year's business of another. Such a ratio is absolutely meaningless, even when it is not absolutely misleading. As well might a man take his six-months' wine bills and compare them with a year's butcher's bills, in order to show his temperance proclivities!

But this is not all. We also pointed out the error of the assumption of the *Electrician*, for the purpose of the same calculation, that an 8-candle power incandescent lamp is equivalent as an illuminant to a gas-burner consuming 5 cubic feet per hour; and stated that such a consumption of gas is required by statute to give the light of 16 candles. Our contemporary refuses to accept the correction, and avers that "it is as impossible to make an ordinary 5-feet burner give 16 candles as it is to make a man sober by Act of Parliament." But, surely, if we are required to start with the assumption that an 8-candle power incandescent electric lamp necessarily and invariably gives the light of 8 candles, it is not unfair to take gas also at its normal rating. The 8-candle incandescent lamp, to which the output of the central station lighting companies is referred in all accounts bearing upon the subject, is as much a convention as the 5 cubic feet gas-burner. Many, probably most, of the lamps in actual or potential use from which it is derived, are nominally of 16-candle power, or more. For the sake of uniformity and simplicity—and also because the number makes a better showing—the Companies reduce their output to the 8-candle lamp standard; but no electrician needs reminding that the full rated power of an incandescent lamp soon falls in actual use. With 16-candle gas, on the other hand, while it is true that with bad burners less than the normal illuminating power is obtained by the consumer, it is not true, as the *Electrician* asserts, that "new Sugg and Bray burners of the ordinary make hardly give 2 candles per cubic foot, and often less than 1½." And it is incontestable that, wherever a little care can be exercised in the selection and use of gas-burners—as in domestic lighting of a good class, in shops, offices, warerooms, &c.—the consumer has at his command a wide selection of burners which can be depended upon to give very much more than the statutory duty of 16 candles for a consumption of 5 cubic feet per hour. The sooner our friends the electricians cease amusing themselves with the illusion that there are no such things as high-power, economical gas-burners, and that the world is content to take their lamps at their own valuation, the less risk will there be of the recurrence of such misunderstandings as that which has led us to put forward these remarks.

Most of the electrical manufacturing concerns whose accounts for the past year's working have recently been published, appear to have done pretty well of late. There has evidently been a good deal of business going in supplying machinery, mains, and apparatus to new central stations; and the contracts must have been fairly distributed among the leading firms in these lines. Whether central stations pay or not, they must have plant to go on with; and the provision of this plant is and has all along been the most profitable branch of electrical industry. And it is worthy of remark that, apart from such monopolist concerns as the Edison and Swan Company, the most successful electrical firms are those which had a sound mechanical engineering foundation. This is precisely the line of development which we long ago predicted as being the most promising for the new electrical industry. With the single exception of the Brush undertaking, which went into engineering some time after it started as a monopolist speculation, not one of the patent-right ventures which ten years ago were announced as being sure of a prosperous future, is now in active existence. In short, electricity as a branch of engineering is not bad business when properly managed. Men like Mr. Crompton and Mr. Parker have been able to do very well in it. As a branch of physical science, again, electricity is a good field for the specialist, as Dr. Hopkinson and others have found. Electrical engineering as a profession, however, like electrical supply as a business, has its profits yet to make. There are many electric lighting companies that will never return a dividend to their ordinary shareholders; and there is a host of so-called electrical engineers who will never earn more than plumbers' wages, if so much. Complaints are raised against the action of the Blackpool Corporation in advertising for an electrician in the usual municipal fashion—*i.e.*, requiring candidates to name the salary they are willing to accept. It is wearisome work protesting against this species of tyranny; but we are quite ready to support our electrical friends in drawing attention to the unfairness of such invitations. The state of the employment market for electrical specialists is so desperately bad, however, that it is remarked in one quarter that the Blackpool Corporation might expect an offer of a handsome premium from some candidate for the opportunity of getting an insight into practical work.

It is taking a great deal of "drumming" to procure satisfactory electrical exhibits for the English section of the Chicago Exhibition. Mr. W. H. Preece is desolated at the prospect of the poor show the English electric lighting industry is likely to make at this exhibition. The historical Post Office exhibit, as displayed at the Crystal Palace, is going over practically *en bloc*; and if the same attendants go as well, the Americans will receive a good illustration of the splendid way in which the Telegraphs Department of the General Post Office is served. But there is, of course, no commercial risk to be dreaded in regard to this exhibit. On the part of English commercial firms, there is an intelligible reluctance to allow American manufacturers to "suck their brains," while protected by M'Kinleyism from all danger of competition at home. Rightly or wrongly, the Chicago enterprise is not recommending itself more favourably to foreign manufacturers as the time of closing for entries draws near.

A POPULAR VIEW OF THE LONDON GAS SUPPLY.

AN article with the somewhat hackneyed title of "How to Make London Smokeless" appeared in the *Gentleman's Magazine* for last month. It is signed Lynn Cyril D'Oyle, which is not a name known to us in connection with the industry of gas supply; but the most truly remarkable thing about the writer is that, although not a professional, he really has a respectable knowledge of gas matters, which he directs to the solution of the problem expressed in the title of his article. Now, we make a point of noticing all intelligent outside criticisms of the manner in which the gas industry is carried on, and of the objects which it is directed to attain, in order that no really helpful suggestions shall be overlooked. Consequently, when we came across Mr. D'Oyle's article, and perceived by its opening lines that it was designed to be a study in gas, we concluded to examine it carefully, and, if worthy, to bring the gist of the writer's observations before our readers, together with such comments upon them as they might appear to require. It is gratifying to find, to begin with, that Mr. D'Oyle is prepared to take the gas industry of this country as a great fact. He does not "mount the high horse," and, from the unattainable eminence of his own conceit, look down upon gas making and gas makers as grovelling, ignorant subjects of contemplation. Indeed, he frankly concedes to coal gas the character of "one of the greatest conveniences of modern life;" and there is always hope for a would-be instructor of the public who starts so fairly. Mr. D'Oyle finds that the public generally, while apt at catching hold of smart phrases such as the expression "to lie like a gas-meter," knows far too little about gas and everything connected with it, including meters; and he therefore proposes to enlighten his readers' minds upon the subject by way of leading up to his grand proposition of the way to render London "a fit place for white people to live in." Briefly stated, this way is no other than "the universal adoption of gas, and gas only, as our heating agent." True, the suggestion is not exactly new; but it is worth while to follow Mr. D'Oyle in his revival of it. He does not pretend to any novelty in the suggestion itself; but he thinks it is something new to introduce this "delivering agent," as he terms gas, "in the garb of domestic economy." Mr. D'Oyle's modesty is not illimitable, however, for he goes on to remark that he thinks it is "even a novelty for one versed in the minute details" of the manufacture, distribution, and properties of gas, "to write as a consumer and in language that all other consumers may understand."

This is a large claim to authority. If we were asked to name an authority versed in all this knowledge, we should hardly know what reply to make; and even after reading his article, we should hesitate to name Mr. D'Oyle in such a connection, if only because—to spare other reasons for the moment—on the third page of his essay we find the statement that "the only heating agent of any consequence in coal is the gas," which is to make a free gift of all the fixed carbon of the coal—an unpardonable piece of extravagance in a professed economist. But our author is a man of striking, if not of new ideas. He goes on to lament that gas cannot be mixed in the holder with the exact quantity of air to give the greatest attainable heat, and thus be supplied to stoves and furnaces under pressure; for then, he says, the best result would be given. He sees, however, that such a scheme is not feasible, on account of the "terrific explosive force of such a mixture." It will be gathered from this passage that Mr. D'Oyle does not mind expressing an opinion, whether or not his knowledge is equal to his boldness. Taking the gas as it is, however, Mr. D'Oyle declares, with large contempt for details or qualifications, that such gas, burnt in an atmospheric burner,

gives "three times the heat from a ton of coal that we could get by consuming it in an open fireplace, and twice the boiling power that could be obtained by the best regenerative furnace." This Mr. D'Oyle takes to be "a great law in domestic economy." It is rather a pity that this interesting writer does not always see that, in order to be "popular," it is not necessary to be loose.

He gets nearer to the facts when he reminds his readers that, "under existing circumstances, gas cannot be supplied by our companies at a much cheaper rate than is now the case; and taking it at 3s. per 1000 cubic feet, although it can, if judiciously used, easily compete with coal as a direct heating and cooking medium, yet there is not a great margin for the wastefulness of servants and guests in a mismanaged household." This is very sensible ground to take; but Mr. D'Oyle has set himself to prove that gas can be made to replace solid fuel for all domestic purposes, and at a clear saving; so it follows that some other system of supply than that practised by the companies must be adopted if Mr. D'Oyle's ideal is to be attained. It is only fair to the author to admit, however, that he does not postpone all reforms to the advent of his great scheme. He thinks that gas consumers might get very much more comfort from their ordinary supply than is obtained by nine out of ten householders who have never made a study of the subject. He points out that "careless and unthinking servants," who have not their master's welfare at heart, will flare away gas if not looked after. So they will coal, as he says, for the matter of that; but the difference between the two fuels, as regards ease in wasting, is that whereas a coal fire will soon burn itself out if not replenished (which means labour), gas will go on burning until somebody takes the trouble to turn it off. Again, although he does not recommend a gas-fire of any known make as economical if used all day long, as in a sitting-room, he remarks that such an appliance is a saving in expense, and a great boon if fixed in any room where a fire is only wanted occasionally, or for a few hours a day. Among these may be classed most mercantile and professional offices, shops, and warerooms, where the dirt and trouble of a coal fire are so objectionable that busy men will often go without warmth, to the peril of their health, rather than resort to this means of obtaining it. Wise also are Mr. D'Oyle's remarks upon the desirability of having as good gas-burners in kitchens and domestic offices as in any part of the house, and of employing enclosed gas-burners where ceiling decorations, &c., are to be considered.

All these hints, however, are offered but as palliatives to render existing conditions more endurable. It is Mr. D'Oyle's grand suggestion that gas should be made at the pit's mouth, and piped to London. "A series of trunk mains, running direct from the coal districts to different parts of the city, could therefore supply London with fuel in this form far cheaper than railroads or ships can do it at the present time in the form of coal." Mr. D'Oyle knows that a ton of coal weighs a ton, as he says; but he is under the impression that when converted into gas "it comes at once as a decimal in gravitation"—whatever this may mean. He hardly realizes the fact that the gas produced in the ordinary way from a ton of coal weighs between 350 lbs. and 400 lbs., and certainly cannot be driven through miles of main for nothing. As he admits, it is just a question between the comparative advantages of carbonizing coal at the mouth or the pit instead of in London; which he does not appear to recognize as having been discussed before. Perhaps he would be surprised to hear that many years ago the late Sir W. Siemens went even beyond him; for that bold innovator actually proposed to put the carbonizing plant at the bottom, instead of at the top of the pits, and so save hoisting as well as land carriage.

Mr. D'Oyle reckons, among the advantages of the proposed change, a saving of 8s. per ton upon the coal, and a smokeless London. Although the latter boon would be worth millions, the author does not propose to charge anything for it, but to take it as an incidental benefit. It is cruel to throw "cold water" upon such a charming scheme—on paper; but, really, Mr. D'Oyle should have worked his project out a little more thoroughly, since he claims to know all about gas making, and have shown its feasibility with reference to the various and manifold aspects—political, social, and economical—under which it should have presented itself to his mind. We will suggest some of these. To begin with, has the author any conception of the greatness of the shifting and subsequent concentration of a particular class of the labouring population which such a scheme would involve? The problem of Beckton is sufficiently troublesome; but Mr. D'Oyle would "put all his eggs into one basket" with a vengeance. Supposing his centralized gas plant had been in Durham this year, what would London have done then for gas? The minor question of the disposal of the residuals is another problem, which we cannot pretend to adequately discuss here.

It will be to a better purpose, perhaps, if we dismiss altogether the author's ill-digested centralizing scheme, and take into consideration one or two opinions he expresses concerning the conduct of gas undertakings in the present. He observes that much more coke would be used now in private houses if it were not for the sulphurous fumes that such a fire emits; and he concludes that "coke should not be supplied direct from the gas companies to the consumer, but ought to pass through intermediate hands, where it would be broken and screened into several different sizes to suit different grates, and where it would also be submitted to some slight chemical process which would extract the remaining sulphur and minor products that it still retains, without interfering with the heating properties." This is a mistake. The introduction of any more middlemen in the coke trade would only heighten the price of the fuel to the consumer; and the gas companies can, and do, break and screen it to suit all purposes. There is no known means of removing the sulphur from coke; and if any such process should be discovered, it could better be carried out at the gas-works than elsewhere. The sulphur of coke is certainly an objection to its use in the open fireplaces of sitting-rooms; but an even greater drawback is the large proportion of dirty ash which it contains, and which causes it to compare unfavourably with the best house coals. If English coals were less cleanly, or ranged higher in price, householders would put up with coke, as they do on the Continent, where, with suitable stoves for burning it in, it is far more popular than the poor and dear native coals.

Mr. D'Oyle thinks there is room for economy in the handling of coal on its way to the retorts, and also in the working of the latter. These points, it is hardly necessary to remark, are receiving the attention of gas engineers, who are fully alive to the importance of reducing hand labour in coaling and gas making. With regard to gas purification, also, Mr. D'Oyle passes some severe strictures upon the requirements of the London Gas Referees; and he declares that all the trouble and expense of reducing the sulphur compounds according to the Referees' scale are thrown away, seeing that, after all that the law demands in this regard has been complied with, "probably no one on earth but a Referee is the wiser—or the better off." The author also discusses intelligently the vexed topics of gas-blackened ceilings and of testing for illuminating power; and he terminates his generally interesting article with the semi-apology that if, in his writing about gas, he has seemed to take the part of existing gas companies, "it is merely with the idea of 'giving the Devil his due.'" The remark is hardly flattering to its subjects. But grudging justice is better than none; and the gas companies are not likely to complain of a critic who, with all his shortcomings, is so manifestly desirous of being fair to them as is Mr. D'Oyle. It could have been wished that Mr. D'Oyle had not so unreservedly recommended a line of reform in gas supply which must be pronounced impracticable; but any honest attempt to impress the public with a sense of the character of the work done by the statutory providers of gas deserves welcome and commendation.

The Recent Destructive Fire at St. John's, Newfoundland.—As far as we could learn from the accounts of this calamity which reached us through the papers, the gas-works at St. John's were uninjured. According to a map showing the extent of the conflagration which appeared in *The Times* last Thursday, the works are situated about 1000 yards beyond the westernmost boundary of the area actually burnt; and as the gale prevailing at the time of the occurrence was from the north-west, the flames were driven away to the south-east—unfortunately to the destruction of practically the entire city.

Institution of Mechanical Engineers.—The summer meeting of this Institution was opened in the Town Hall, Portsmouth, last Tuesday, under the presidency of Dr. W. Anderson, F.R.S. There were between 200 and 300 members present. After an official welcome by the Mayor (Mr. T. Scott Foster), the business was commenced; the whole of the first sitting being devoted to discussions on the application of mechanical science to the purposes of naval warfare. In the evening the Institution dinner took place at the Esplanade Hotel, Southsea. On the following day, Sir F. Bramwell gave a description of the Portsmouth sewage-outfall works; and Mr. W. B. G. Bennett contributed a paper on the Southampton sewage precipitation works. In the afternoon the members visited the Portsmouth sewage works and pumping-station, over which they were conducted by Sir W. Pink, Chairman of the Drainage Committee of the Corporation, and Sir F. Bramwell. The remainder of the week was devoted to excursions and visits to neighbouring sanitary and engineering works.

A Remedy for Sulphur Compounds in Gas.—In view of the recent remarkable increase in the sulphur contained in the gas supplied to various testing stations in the South of London, attention may be directed to a circular issued by Messrs. M'Dougall Brothers, of Mark Lane, in which an explanation is put forward. They point out that, during the colder months in the year, some of the traces of sulphur contained in the gas after purification are slowly absorbed by the water in the gas-holder tanks; and as it is often costly and inconvenient to change this, the compounds steadily accumulate. As soon as hot weather sets in, the large surface of the holder is exposed to the direct action of the sun's rays, and a considerable portion of the heat derived therefrom is necessarily conducted to the water. The temperature is thus raised sufficiently to drive off some of the absorbed sulphur compounds, which are afterwards found in the gas. Messrs. M'Dougall Brothers have given special attention to this matter, and they claim that they have, in their "purifying liquor," succeeded in producing a simple and effective remedy for the trouble, which is a source of much anxiety to gas managers, arising as it does from causes which they are apt to overlook.

TECHNICAL RECORD.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting at Stirling.

The North British Association of Gas Managers held their Thirty-first Annual Meeting at Stirling on Thursday last. Stirling is a metamorphosed town. There are evidences of its former military character; but, take these away, and it would be difficult to realize that, not much more than a hundred years ago—only shortly before the invention of gas lighting—it was a walled town with a fortress. The old Castle fortress is still there, but it is impotent; and the walls, though not entirely demolished, instead of encircling the town are themselves surrounded by it. As it was seen last week, smiling under the summer sun, it looked one of the most pleasant of quiet residential Scotch towns. But it is more; it is the most accessible of them all. Until the opening of the Forth Bridge it stood at the nexus of all the Scotch railway systems; and under a commercial *régime*, it retained its former character of being the "Key to the Highlands." That exclusive position has now been lost; but it is still the most conveniently reached of all places in Scotland, and this characteristic is a most important factor in the matter of attendance at gatherings of such a widely-scattered body as gas managers. As might have been expected, therefore, when the President, Mr. Adam MacPherson, of Kirkcaldy, called the members to order in the Albert Hall, there was found to be a turn-out equal in numbers to any of the meetings of recent years. There were, at the same time, an unaccountably large number of absentees among the more distinguished members. None of the veterans—Mr. T. Whimster, of Perth, Mr. W. Mackenzie, of Dunfermline, nor Mr. J. Hall, of St. Andrews—were present. Nor were Mr. W. Foulis, of Glasgow, Mr. Samuel Stewart, of Greenock, Mr. Alex. Smith, of Aberdeen, Mr. R. Mitchell, of Edinburgh, or Mr. F. T. Linton, of Leith. Doubtless these gentlemen had each of them quite satisfactory reasons for not being present; but such a large roll of absentees must have been a matter of regret to those who were present, as it probably was to those who were not. The business, however, went on unflaggingly from start to finish; and the Association are to be congratulated on being able, when what may be called the first rank are not in their places, to make such a creditable show with their younger members.

Mr. MacPherson makes a splendid Chairman. He is prompt and pointed in his remarks; and his excellent judgment and unfailing *bonhomie* helped the meeting to get through a heavy day's work up to time. In his presidential address, he tackled the leading problems of the day in a common-sense rather than a heroic spirit. There was no brag or bluster in what he said. His was simply the position of the man who knows that he has a strong position, who sees the approach of conflict but is not dismayed, and means to stand to his guns. He had, he confessed, nothing strikingly new to speak about; whatever is new in apparatus or processes being, to a large extent, still under trial. It is to be observed, however, that he accepts, as almost already settled, the doctrine so unacceptable to many, that, in the near future, gas managers in Scotland will be compelled to supply a gas of lower illuminating quality than they have hitherto been accustomed to supply; and that he favours the regenerative system of retort-settings, the oxygen process of purification, and the promotion of a day consumption of gas. These are all subjects of great importance to the gas manager; and Mr. MacPherson's position with regard to them is that of a hopeful progressist. He was deservedly thanked for his interesting address.

The discussion upon Mr. Macfie's paper on regenerative gas-lamps did not disclose a very intimate acquaintance with that form of lamp, even though the members had had a whole year to think over it. The experience on this occasion should make the members chary of deferring subjects for discussion. The discussion was, in fact, a sort of "hovering" one; nobody save Mr. Hall, of Montrose, having anything very definite to say on the question He had been at the pains to make a series of accurate observations; and the remarks he made were a valuable contribution to the subject. There was a pretty general consensus of opinion that the local plumber was, with regard to regenerative lamps, a dangerous customer to have about; and this, apart from Mr. Hall's figures, was perhaps the most useful lesson which can be learnt from the discussion. Mr. Macfie himself has a very thorough knowledge of the subject; but, in closing the discussion, he threw his facts and opinions so fast before the members that it was with the utmost difficulty they could follow him.

Mr. J. M'Crae's paper on "Coal Analysis" was a well-timed production. He "spared not" the coalowner, but showed, in trenchant sentences, backed up by undeniable figures, that the recent tactics of some colliery masters had been carried farther than is quite decent. Some heat was developed over the paper. Mr. Hall, of Montrose, who is a most accurate man, was again to the front with figures which he had arrived at by his own observation, and which showed that the "printed analysis" form of recommending coal is a delusion and a snare. Mr. Whyte, of Seaham Harbour, a Scotsman in charge of a gas-works in England, threw out an opinion which, put into plain language, meant that he believed coalmasters did send out analyses which they knew to be false; and his remarks had the effect of bringing a coalmaster to his feet with the protest that Mr. Whyte's experience must be an exception to the general rule. It was Mr. Hislop, of Paisley, however, who set the meeting "by the ears" with his theory that coal could only be properly tested after it was deprived of its superabundant moisture; and that all coal should be tested with the same proportion of moisture. After he had spoken, the discussion turned upon his remarks more than upon Mr. M'Crae's. In fact, there seemed to be a dead-set made against Mr. Hislop's position; and the questions to him were numerous. Mr. M'Gilchrist, of Dumbarton, suggested that the subject should be sent to the Committee of the Association for inquiry and report; and this was assented to.

In the midst of the discussion, the meeting adjourned for luncheon, which was served in the building; the Stirling Gas Company acting as hosts. Provost Kinross, the Chairman of the Company, in a few graceful remarks, welcomed the Association to Stirling; and the President, in one of those neat impromptu speeches for which he is famous, returned thanks for the reception the Directors had given them.

In the resumed discussion on Mr. M'Crae's paper, a very valuable suggestion was made by Mr. D. M. Nelson, of Glasgow, who, as an outsider, advised gas managers, when selecting samples of the coal which they wished to test, to visit the colliery, and see that a fair sample was supplied to them. On this point, it is interesting to note that Mr. Hislop advised much the same thing when he said that a truck of coal taken from a heap might or might not be a representative sample. His advice was that a complete section of the seam of coal should be obtained. The discussion revealed considerable difference of opinion, and even haziness, upon the whole matter; and it gave some colour to the proposal by Mr. P. Tocher, of Peterhead (a chemist, but not a member of the Association), who was called upon to speak, and who advised that a standard method of testing, which would include temperature, photogenic power, length of charge, and other matters, should be procured. However, as Mr. M'Gilchrist's proposal of a remit to the Committee was adopted, this, along with other phases of the subject which at the present time sorely vex gas managers, will no doubt receive attention.

The paper by Mr. Mackay, of Peterhead, upon his experiments in connection with the enriching of coal gas with oil, was taken next. Mr. Mackay in these experiments showed a scientific mind which should make many who are in charge of much larger works envy him. Without doubt, he approached the subject in a spirit which does him credit; but he is entitled to greater credit for the careful and accurate observations which he conducted along with his experiments. He seemed to have covered the whole field, and to have left nothing unlooked at which would tend to clear up the many intricacies of the process. Unfortunately, he gave so much that the meeting was unable to follow him; but that is not his fault. It only shows in what a nebulous state are the members generally on one of the most pressing questions of the present day. Of course, the managers of small works cannot be expected to keep themselves abreast of a new subject. But there are surely larger works in which experiments with oil have been made; and the question may be put why no one was present to tell what results have been arrived at. There is Leith, for instance, where one of the Edinburgh and Leith Gas Commissioners has been experimenting for several months. Why was there nobody present to tell what they have done, and what they have found out? However, no one is compelled to reveal anything, and the good things at Leith may come in handy at the adjourned discussion which was resolved upon. The only contribution of value which was made to the short discussion upon Mr. Mackay's paper was by his townsman, Mr. Tocher, who gave an explanation, from a scientific point of view, of the results in tar and benzene which had been arrived at through Mr. Mackay's experiments.

The last paper on the list was by Mr. George Keillor, of Nairn, upon gas-consumers' grievances. Mr. Keillor's was a practical paper. He showed how he had dealt with concrete cases; and he emphasized the old maxim that to succeed in a business, one must pay attention to it. There was nothing more in the paper; but he was certainly justified in pointing out that in the present day the old policy of endeavouring to take a high hand with consumers will not do. They must be followed, hat in hand; and every complaint must be attended to, and that promptly, or a customer may be lost. If this truth can be brought home everywhere, Mr. Keillor's paper will have served a useful purpose. In the discussion upon it, the advisability of gas-supplying bodies doing all repairs to gas-fittings, instead of allowing outside plumbers to interfere with them, and of retaining control of the gas supply down to the point of combustion, were dwelt upon.

The business of the meeting was concluded about a quarter to five o'clock—a well-timed conclusion, as the members were by that time ready for dinner. This was served in the Golden Lion Hotel. Mr. MacPherson again presided; and Messrs. R. Robertson, of Bathgate (Past-President), and Mr. T. D. Hall, of Montrose, the President-Elect, were the Vice-Chairmen. Mr. R. Mitchell, of Edinburgh, had by this time arrived from Carnoustie, where he is spending his holidays; and he was present and took part in the speaking which followed the repast. There was a pretty extensive toast-list, interspersed with singing

and recitations. But the evening being a glorious one, a large proportion of the members preferred the open air; and the attendance was rather thin towards the end.

Mr. MacPherson, on taking the chair, said he had great pleasure in meeting so large a number of members. He was sure their proceedings this year would be more than usually interesting, especially with reference to the next day's ceremony; and he was very glad to think that the members had mustered so well to do honour to the memory of William Murdoch.

Report of the Committee.

The Secretary (Mr. R. S. Carlow, of Arbroath) read the annual report of the Committee, as follows:—

The Committee now present the annual report in the form agreed on at the 1885 meeting; and the following statements give a general outline of the business done, with some notes that may be interesting.

No question of any great importance, or any special subject, either in regard to the manufacture or distribution of gas, has been brought under the notice of the Committee for consideration. The Committee's duties, therefore, have in this respect been of a very light nature during the past year; and they have now no special point to lay before you for your approval.

The Benevolent Fund in connection with our Association has not been drawn upon during the past year.

The Annual Report of Proceedings, 1891, was published and sent to each member of the Association, according to the rules. It contained the President's address, papers and discussions thereon, a list of Past-Presidents, new members admitted, names of members of Committee, rules, balance-sheets, &c.

The Statistical Report for the year ending July 31, 1891, was compiled and bound together with the Annual Report of Proceedings for 1891, and issued to all the members of the Association, as well as to those who gave the necessary information.

The Committee, at a meeting held in Glasgow on the 8th of June last, took into consideration the four questions put into the question-box at the last annual meeting, and which were remitted to the Committee to be dealt with.

Question No. 1.—"What is understood by the use of dry lime in purifiers instead of milk of lime?" *Answer.*—What is understood by the use of dry lime in purifiers is lime hydrated to such an extent as to retain the form imparted to it on gentle pressure; and milk of lime is lime and water in combination, of the consistency of milk or cream.

Question No. 2.—"What would you suggest as the best method for the prevention of rust on the sides of purifier-covers?" *Answer.*—Frequent application of tallow, tar, or paint.

Question No. 3.—"Is a gas or steam engine the more suitable motor for an exhauster in a small gas-works?" *Answer.*—The Committee are of opinion, taking all circumstances into account, and seeing that the manufacture of gas is continuous, the steam-engine is preferable.

Question No. 4.—"Is it not advisable that the Association should recommend coalmasters to fit up small testing gas-works of their own, so that they could send out practical working analyses, instead of laboratory analyses, as they are misleading for the purchase of coal for practical working in gas-works; and in case of any dispute as regards quantity of gas per ton or illuminating power, 1 cwt. of the coal could be selected from the coal sold, and sent back to the colliery, and, if deficient, according to the purchase of the coal, the differences could be easily rectified, with satisfaction both to the coal merchant and the gas company?" *Answer.*—The Committee consider this question may be answered by a paper to be read at our meeting to-day.

The Committee have also resolved to propose to the general meeting to-day that the name of Mr. William Young, of Priorsford, Peebles, be added to the list of honorary members of the Association, in recognition of the great interest he has taken in the welfare of, and for the excellent services he has rendered to the Association for so many years.

The Committee regret to state that they have been under the necessity of deleting this year a larger number of names from the roll of membership than usual, owing to deaths, parties resigning, and parties in arrear with their subscriptions. Still, it is gratifying to find that there are always a number of parties applying for admission as new members, thus showing that the Association is accomplishing the ends for which it was originated.

The President said that, before submitting the Committee's report for approval, he wished to give an opportunity to any of the gentlemen whose inquiries had been answered, if they thought the answers given were not satisfactory, to put further questions or ask for explanations.

There being no response to this offer,

The President submitted the report to the meeting, and it was unanimously adopted.

The Roll of the Association.

The Secretary then reported that the total membership a year ago was 231; and that 21 names had been removed from the roll—leaving 210. The following 14 gentlemen were, however, admitted to membership, raising it to 224, at which it remains for this year: Ordinary Members—Allan, A., Neepsend, Sheffield; Armitage, C., Lancaster; Auchterlonie, J., Mullingar; Ballantyne, J., Stevenston; Fulton, J., Renfrew; Love, G. R., Dundalk; M'Kechnie, J., Dunbar; Renfrew, P., Lochwinnoch; Stewart, J., Strathaven. Associates—Chalmers, F., Alva; Gibson, J., Paisley; Hislop, R. F., Paisley; Thomson, R., Inverness. Extraordinary Member—Dennis, J., Dalkeith.

The Murdoch Memorial Fund.

Mr. James M'Gilchrist (Dumbarton) presented the annual statement of the Murdoch Memorial Fund, as it stood on July 26. He stated that the balance from 1891 was £317 17s. 6d.; one subscription, amounting to £10 (from Messrs. J. Ross and Co., Falkirk), was received during the year; and, with interest added, the amount of the fund was now £333 2s. 4d. He might mention that the sculptor's fee for the bust of Murdoch was 100 guineas; and, after all the expenses were paid in connection with the unveiling of the bust, he thought they would have £200 as the nucleus of a fund to be applied in the way of a bursary. It was hoped by the members of the Committee that they would be able to raise at least £500, so that they might still further honour the name of Murdoch by founding a bursary called after him. Lord Kelvin had kindly consented to consult with the Committee the next day about the form the bursary should take, so as to be most proper for the commemoration of the inventor of gas lighting.

The report was adopted; and the Memorial Committee were re-appointed, with Mr. M'Gilchrist as Secretary and Treasurer.

The Financial Statement.

Mr. R. B. Main (Glasgow), the Auditor, submitted his report on the Treasurer's accounts, and said he had found everything correct. He thought that the state of the funds was exceedingly satisfactory; and that the Association were to be congratulated on having a Secretary such as they had, because the duties of the Auditor were slight indeed. The General Fund amounted to £153 18s. 5d.; the Benevolent Fund, to £254 4s. 9d.; and the Research Fund, to £86 2s. There was only one thing which he thought might assist the Secretary, and that was that the members should send in their subscriptions promptly.

The President said he was very glad to learn that the funds of the Association were in such a good condition. They had had more expense this year, as compared with last, owing to their Statistical Report not having been printed then. It had been printed this year, and issued along with the report of the proceedings at their annual meeting in Edinburgh; and they intended to publish it every year. They had in Mr. Main an excellent Auditor in place of Mr. Peebles; and he (the President) would move a vote of thanks to him.

This was very heartily accorded.

Honorary Member.

The President said his next duty was a very pleasant one indeed. He had to propose that they should admit Mr. William Young, of Priorsford, Peebles, as an honorary member, as suggested by the Committee in the report. He was quite sure it required no recommendation of his to induce the members to accept the proposal. They were all acquainted with Mr. Young, and they knew the papers he had communicated to the Association from time to time. He thought their records contained no more valuable papers than those which had been contributed to them by Mr. Young. What was proposed was the only return they could make to him; and he (the President) considered that Mr. Young was fully entitled to the honour.

The recommendation was cordially agreed to.

The President's Address.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—I feel my first duty to be to return you my warmest and most grateful thanks for the honour you conferred upon me, for the second time, when you last year elected me to the position of President of this Association. I trust that during the year that has gone I have been able to maintain the traditions of the past presidents, and that in discharging the duties that yet require my attention before my term of office expires, I may be enabled to act in such a way as shall meet with your approval and support, and as shall contribute to the comfort and convenience of everyone here present. With the kind indulgence and assistance which you are ever ready to accord to your President, I think I may be allowed to predict for this meeting a success second to none of its predecessors; and I would ask you, one and all, to do your utmost, not only to make it such a success as we have never hitherto attained, but worthy of the centenary of gas lighting, and of the great and noble man to whose inventive skill and indomitable perseverance we owe the establishment and foundation of an industry of such magnitude as that of the manufacture of coal gas. Each and every one of you can contribute to this end, by taking an active part in the proceedings of to-day, and so adding to the general store of information on all matters connected with the manufacture, distribution, and consumption of gas. I fervently trust that everyone will give us the benefit of his judgment and experience, by joining in the discussions which will take place on the papers to be read to-day.

It was in the year 1792 that William Murdoch first applied gas as a substitute for the then existing illuminants—oil and tallow candles; so that we have now had the benefit of one hundred years of gas lighting. I think everyone will be ready to acknowledge that to William Murdoch belong the honour and merit of the first application of coal gas to practical purposes, and that the Cornish village of Redruth was the scene of this historical event. If we compare this first humble application of gas with its almost universal use now, not only for lighting, but also for cooking and heating purposes, as well as for motive power, we cannot but become impressed with the magnitude of the benefits and blessings which have flowed from the discovery, nor fail to realize how much Murdoch's genius has done for the whole human race. We must all feel that we lie under a deep and lasting obligation to William Murdoch. If we simply look at the benefits derived from the greater comfort, freedom, and security we now enjoy compared with what our forefathers enjoyed, we shall be able to recognize Murdoch as a great benefactor. But when we think of the immense

benefits that have resulted from the use of gas for various purposes, and the immense assistance it has been in the development of other great industries, we cannot too highly appreciate the genius of the man who first applied it as a lighting agent, nor can we overvalue his services to mankind. And whilst it is, as I have said, undoubted that to Murdoch belongs the honour of being the first to apply coal gas as an illuminant, it is equally undoubted that to Scotland belongs the honour of having produced a man of such remarkable and outstanding genius; and of this fact we, as Scotsmen, are justly proud. On the subject of William Murdoch, I might continue to discourse to you for hours, without exhausting or doing justice to it; but time will not permit me to do so. In this, the centenary of gas lighting, I could not overlook the subject; and I feel sure you are all pleased to know that to-morrow we, as an Association, are to do a little to show our respect and esteem for the memory of our great fellow-countryman, by unveiling a bust of him in our National Wallace Monument. Believe me, gentlemen, this is only a mere fraction of what we intend to do to perpetuate the memory of Murdoch. The Murdoch Memorial Committee does not intend to relax its efforts until it has obtained sufficient subscriptions to enable it to found a bursary, or some other such worthy memorial, so that all young Scotsmen may know what can be accomplished by the proper exercise of that gift which is said to be peculiar to us dwellers in the North—determined perseverance, coupled with uprightness and integrity; and so that they may be incited to follow in the footsteps of one who, though of humble origin, was in every relation of life worthy of our highest admiration.

I am pleased to be able to inform you that this Association still continues to prosper in a most satisfactory manner; in fact, I may say ever since its inception its record has been one of continued and unbroken progress. And as, year by year, we have gone on improving on our constitution, in the papers submitted for our consideration, and in our discussions thereof, one cannot but become conscious of the fact that it was fortunate that the idea of founding such an Association was not only entertained, but acted upon by those to whom we are indebted for its establishment. It is quite evident it only needed some such institu tion to break down the barriers of exclusiveness and professional jealousy which, in the olden time, I am informed, existed all over the land. At that time managers of gas-works kept the benefits of their experience and labours to themselves, instead of, as now, fully and freely imparting them to their neighbours, and vieing with each other in rendering assistance, by advice or otherwise, to those who may require it. To Associations such as ours we are indebted for this reform. Not only is good done in a professional sense by Gas Associations, but they foster the true Christian spirit of brotherly love. I am certain there are very few, if any, of our members who do not look forward to our annual meeting as a bright spot in their lives. It is an occasion when their hearts overflow with kindly feelings towards all their fellow-members. They rejoice to meet each other for social converse and good-fellowship, as well as for the improvement of their minds in all that relates to their profession; and then they return to their arduous duties strengthened and refreshed, and rendered fitter to battle with and overcome the difficulties and trials which are yet the daily lot of the gas manager.

During the past year, both gas companies and corporations have had to face a material rise in the price of cannel, more especially of the higher-class cannels; but it is gratifying to observe that, although an advance in the price of gas was inevitable in many instances, this has not had the effect which such a course sometimes has—a diminution of consumption. It will have been noticed that there has been a steadily growing increase in the consumption throughout the year, and this also in the face of an increased application of electric lighting. How long this yearly increase will continue is a problem which, in my opinion, is difficult to solve; but I need scarcely say that we at least anticipate its continuance for many years to come. We know and acknowledge that in electricity and oil we have foemen worthy of our steel; but we are not afraid of the contest. It would, however, be most unwise to try to persuade ourselves that the adoption of electric lighting is not steadily on the increase, and that the battle of supremacy must be fought out in the larger towns within the next few years. In this battle, I am sure we will all engage with the full determination that nothing shall be wanting on our parts to make certain that gas will, in the end, maintain its position as the best, handiest, cheapest, and most reliable illuminant for all purposes. At the present time, we know that, light for light, electricity cannot at all compare with gas, so far as cost is concerned. But, as we are sometimes told, we live in an age of progress, and of most wonderful discoveries and inventions; and we do not know how soon inventions or discoveries may introduce a revolution, and materially reduce the price of electricity, and so bring the two more on a level in respect to cost. This we do not for a moment seek to deny. But we also know that, while electric lighting has made rapid progress during the past few years, gas lighting has not been at a standstill. Most important improvements have been made in the way of increasing the light-giving power of gas; and the probability is that there will be a continuance of such improvements. Compare, for instance, the luminosity of gas as in the days of Murdoch, when it was consumed through a thimble with a hole in it, with the light given by the regenerative lamps of the present time, and say if great improvement has not marked the progress and development of gas lighting. In the contest, therefore, the one light has as good hopes of progress as the other. I do not believe that, even with our present high-power regenerative lamps, the utmost value possible in light is got out of gas; and I am quite convinced that a great deal more luminosity than we at present get will yet be attained through improved methods of combustion. Everything considered, I think we are in a position to hold our own for some time to come yet, though doubtless we may, and will, by the application of electricity to purposes and in places where it is more suitable than gas, lose some of what would have been increased consumption. You can all imagine to yourselves such purposes and places. Any loss, however, that we may sustain in this way will be more than compensated by the many new uses to which gas is now being put. It is, I am sure, a most satisfactory experience which we all have, that of the continuous and increasing demand for gas for cooking and heating purposes and for the supply of gas-engines. For this latter purpose, indeed, I anticipate a rapidly increasing demand.

With respect to our other rival—namely, oil—I think we are now about to capture it, and put it out of the field, by converting it from an enemy into a friend, and using it in such a way as will enable us to dispense with the higher class of cannel coal, or compel the coalmaster to moderate his price, and permit of our continuing to supply gas at so low a rate as will enable us to maintain our supremacy, if not to drive all competitors out of the field. I am glad to say that, amongst others who have been experimenting in this direction, with, I understand, very satisfactory results, is a member of this Association, who will place before you to-day the results he has obtained, and the opinions he has formed, regarding the suitability of oil for enriching purposes. There can be no doubt that earnest and determined attempts are at present being made to solve the question of how oil can best be applied as an enricher of poor gas. Our knowledge on the subject has been vastly increased during the past year; and only quite lately we have had some valuable communications by different parties on this subject. Although these show a very considerable divergence of opinion as to the best and most economical means of using oil for enriching, still, this very difference of opinion and results will, I am sure, only serve to stimulate further and even more earnest attempts to successfully solve the question, and place it beyond the realm of cavil. The use of oil as an enricher is not by any means new—it has engaged the attention of gas engineers intermittently for the last thirty years. About thirty years ago, Mr. Walker, the then Manager of the Kilmarnock Gas-Works, took out a patent for the use of oil and peat for the manufacture of gas; the peat being saturated with oil, and charged into the retorts in this condition. The system was, I understand, fairly successful; but the process was abandoned owing to various difficulties, one of which was getting the doors on the retorts, which, of course, in the present day, would be no difficulty at all. Perhaps the chief factor against the adoption of the process was the low price at which good cannel coal could then be got. Since then we have had the Mackenzie process of oil and small coal, as well as others. But not any of these have been followed up with the energy and perseverance necessary to prove their value commercially; no doubt owing to the fact that for many years first-class cannel could be got at very reasonable prices. The recent great rise in the price of cannel has, however, given an impetus to inquiry in this direction, which I feel confident will not be abated until the value of oil as an enricher, and the best means of employing it for this purpose, have been satisfactorily established.

The fall in the price of coal which has now happily taken place will not, I am sorry to say, permit us to reduce the price of gas, as any saving we may experience from this source will be required to meet the loss occasioned by the fall in the price of our residuals. This fall has been sharp and heavy, and has, unfortunately, been the cause of very much inconvenience to some managers, owing to the contractors being unable, in the circumstances, to fulfil their obligations; and not a few have suffered a considerable monetary loss. Taking everything into account, it will not be surprising if a general rise in the price of gas follows. But this step, I am sure, will only be taken where it is impossible otherwise to make a fair and reasonable dividend for the shareholders, in the case of companies; and in the case of corporations, to enable them to meet their obligations.

The general outlook being thus clouded, we must, of necessity, direct our attention to whatever means are likely to help us to produce gas at as low a price as possible; and in this respect I am of opinion that, in the case of larger gas-works, this will be found in the substitution of stoking machinery for manual labour in the retort-house. The saving which can be effected in this way is very considerable; and in the experience of our friend Mr. Smith, of Aberdeen, who has been the first in Scotland to introduce stoking machinery, the saving has been such as to warrant its adoption wherever possible. As it is only in the larger-sized works that machinery can be adopted economically, the smaller works will require to consider whether manual machinery would not effect as great a saving as the steam-power machinery—at least sufficient to induce its more general application in the retort-house. This, coupled with an extended application of the regenerative system of retort-settings, which

is now, no doubt, being carried out by even the smaller-sized works, may be the means of enabling us so to reduce the cost of producing gas as to permit of a continuation of the present low prices, without having to resort to that other expedient which has been had recourse to by some companies and corporations—the reduction of the quality of the gas.

The increased and increasing demand for the supply of a low quality of gas at a low price is characteristic of the times; and we cannot afford to overlook it, more especially when we remember the source from which it emanates. Quite recently, a Merchants' Association recommended a corporation to reduce the candle power of the gas. Such a recommendation shows that a feeling now prevails that the public would be better served with the low-quality gas at the low price. This, of course, is doubtful. But still it is an indication of how public opinion is pointing; and although it is repugnant to the feelings of most Scottish gas managers to reduce the quality in a country where so much high-class cannel is to be found, I think that the day is not far distant when we shall be compelled to do so by the force of circumstances. Amongst some of the other recommendations of this same Association, was one I am sure you will all endorse—viz., "And that the public should use suitable burners, of proper size and quality, to give the best lighting results with their gas." This is the soundest and most sensible advice I have ever heard coming to gas consumers from an outside source. If the public only knew the extent of loss for which their indifference in this small matter is accountable, I am certain their astonishment would be great. But do we, who know how this waste and loss go on systematically, for the want of a little care and attention on the part of consumers, not have a duty to perform in trying to instruct the public in the proper use of gas, and in the employment of the most suitable burners for procuring the greatest possible amount of light? I am quite sure we all acknowledge our duty in this respect, and would only be too willing to perform it, if the consumers would do their part, and not only consult us in regard to their wants, but trust us and carry out our recommendations, which they would very soon discover were entirely for their benefit, and would, in a great number of cases, result in a considerable saving, and in some measure do away with grumbling and dissatisfaction. Consumers, as a rule, are unable to distinguish between a bad light (which may be caused in numerous ways) and bad gas. They fall an easy prey to unprincipled or ignorant gas-fitters, in whom they place the utmost confidence, and who, knowing the almost universal prejudice which exists against gas managers, confidently assert that the defective lighting is solely attributable to bad gas; whereas in almost every case we could point out the cause, which, being remedied, would result in complete satisfaction to the consumer.

During the past year there has been nothing strikingly new introduced, either in apparatus or in the method of conducting our various operations. There are, however, a number of processes still on their trial; and in this respect I may be permitted to refer to the system of inclined retorts, regarding which we are all anxiously looking for information. There can be no doubt that a process of charging and discharging retorts which could be carried out almost automatically, if at all reliable, and not too expensive, would be heartily welcomed and eagerly adopted by the profession generally. Until we have full details of the working of such settings, we can only trust that the promises held out to those who adopt the system will be realized. I hoped to have been able to place before you some such details; but, owing to delay in the construction of the bench, it has been impossible to supply them. I trust, however, we may expect a paper on this subject from a well-known member of the Association, who has introduced the system into his works, and who is well qualified to thoroughly test it. While on the subject of retorts, I may notice the very considerable increase in the number of works which during the present season have introduced regenerative settings. This clearly shows that the advantages of the system have now been recognized and admitted; and these advantages, I am certain, will be embraced by an ever-increasing number annually.

Little need be said at present about the condensing and purifying processes, as, notwithstanding a very generally admitted want of proper and authoritative data to go upon regarding condensation, no effort seems to have been made to supply this want. Each continues, as heretofore, to carry out his own ideas, both as regards the form of apparatus employed for this purpose, and the manner in which the condensation should be effected; and in not a few cases, I am afraid, this part of the manufacturing process is left to itself, as if it were of little or no account. I would advise those who in the past have not paid great heed to this matter to neglect it no longer; and I can assure them that they will be amply rewarded. For the subsequent operation of washing and scrubbing the gas, we have ample choice of appliances. Most of them are efficient, though differing in structure; indeed, it is often difficult for one to decide which is the best. To make a wise selection, one must bear in mind the condition requisite for the removal of ammonia, and this, shortly put, is intimacy of contact between the liquor and the gas. Any apparatus which effects this object must and will be effective; but here also care must be exercised, and the strength of the liquor so regulated as to remove as much of the acid compounds as possible along with the ammonia, while we duly preserve the hydrocarbons from injury. I wish it had been in my power to inform you that the object so long aimed at and so earnestly desired—the removal of the whole of the impurities in closed vessels—had at length been satisfactorily accomplished in practical working. Though this process is still being worked, it yet remains to be shown that it can be employed economically and efficiently. The system is one founded on thoroughly scientific principles; and we may therefore hope that it may yet be brought to perfection, and all mechanical and other difficulties successfully overcome.

Failing the accomplishment of this very desirable object—the removal of the whole of the impurities in closed vessels—attempts are being made to lessen the labour in connection with the purification by lime or oxide, by the revivification of these *in situ*. Judging from the excellent results obtained, the oxygen process is, in my view, the one which will ultimately be universally adopted. It also is a process based on sound scientific principles, and is simple and easily managed, while the results are such as to warrant its adoption wherever the magnitude of the works is such as to make the erection of the necessary plant justifiable. The nuisance so frequently complained of as arising from our present methods of effecting purification, is also by this system entirely obviated; and it is altogether one well calculated to recommend itself to those requiring an extension of their purifying plant. It has been asserted that the same object can be obtained by the use of air; but against this system, as you are aware, I long ago lifted up my voice. I regard it not only as being extravagant, but as being calculated to injuriously affect the quality of the gas; besides, it is most unscientific. It has been, and is sometimes still maintained, that the illuminating power of the gas does not suffer by the introduction of 2 or 3 per cent. of air; but I have no hesitation in saying that this is a great fallacy, as the quality of the gas cannot but suffer from the considerable quantity of useless gases which go to make up the air as used for this purpose, while only the oxygen (a very small portion of the whole) is of any use for the revivification of the purifying material.

While we all vie with each other in our efforts to produce a good and cheap gas, and adopt every system or improvement we think likely to aid us in doing so, I am inclined to think we sometimes seriously neglect a field that would certainly aid us in such efforts if it were persistently and energetically worked—I mean the increase in our day consumption by the use of gas for cooking, heating, and motive power. By an extension in this direction, the cost of production will be very considerably reduced, and a corresponding addition made to the amount of profit earned. I have heard objections to pushing such business, as it necessitates an increased pressure on the mains during the day. Now, I cannot but consider this a very short-sighted policy, even if a slight increase on the day pressure should be necessary, as any small leakage at first would soon be more than counterbalanced by the largely increased consumption obtained. By fostering and encouraging day consumption, we may anticipate profitable results.

The all-important question of labour has not, during the past year, been so forcibly thrust upon our notice as in some immediately preceding years; and for this we are duly thankful, as nothing is more disagreeable than having a body of disaffected men, and living continually over a mine which the slightest friction may cause to explode at any moment. No doubt we each and all of us try, as it is our duty to do, to reduce the burdens of our workmen as much as we can, and to provide for their healthful amusement when off work. By this means we show that we take a lively interest in their welfare; and at the same time I am inclined to think we greatly reduce the spirit of dissatisfaction which seems to have laid hold of working men generally. This spirit is much to be deplored. We should do all we can to help to allay it, and, if possible, hasten the coming of the time when a bond of sympathy and good understanding, along with a spirit of contentment, may exist between employer and employed.

I regret I cannot close my address without having to refer to losses sustained by the Association during the past year. We have again to regret the removal by death of some friends whom we all gladly welcomed to our annual meetings, and who were good and useful members of our Association. I refer to Mr. J. K. Watson, the late Manager of the Edinburgh Gas-Works—a gentleman well known to most of us; and Mr. John Johnstone, of Hamilton. We can only join with our expression of sorrow another of sympathy for those whom they have left behind to mourn their loss.

Fully aware that I have already occupied too much of your limited time less profitably than if you had been listening to the papers on the programme, I can only say I feel how imperfectly I have discharged my duty to you in this respect; but I trust you will, with your usual generosity, overlook my defects, and accept my warmest thanks for the attentive and patient hearing you have accorded me.

I will now conclude with the expression of the hope, in which you will all join me, that this, our own dearly-prized Association, may go on and prosper in the future as in the past, and prove of equal value to the rising generation of gas managers as it has been to the past and the present.

Mr. R. Robertson Bathgate) said he had great pleasure in

moving a hearty vote of thanks to the President for his admirable address. He had travelled over a very wide field in connection with the gas industry; and although they had not all been able to apprehend or take in the thoughts he had suggested, he was sure they would, in their quiet moments at home, when they had leisure, all be very much benefited by it. He had also to ask Mr. MacPherson to allow his address to be printed in the proceedings of the Association.

The motion having been cordially agreed to,

The PRESIDENT thanked the members for the vote, and said that, if his address was of any use to them, he was quite willing that it should be printed in the Transactions of the Association.

READING OF PAPERS, ETC.*

The first of the technical portion of the business before the meeting was a discussion on the paper read by Mr. D. Macfie, of London, at the meeting of the Association in Edinburgh last year, on "Regenerative Gas-Lamps, with Special Reference to the Lighting of Large Interiors," and which was then postponed for want of time. Mr. R. Robertson (Bathgate), Mr. G. R. Hislop (Paisley), Mr. D. Bruce Peebles (Edinburgh), Mr. T. D. Hall (Montrose), Mr. J. M'Gilchrist (Dumbarton), and the President, having spoken, Mr. Macfie returned his acknowledgment for a vote of thanks.

Mr. J. M'Crae (Dundee) read a paper on "Coal Analysis," which created the greatest interest of any communication before the meeting. The author gave a series of examples of printed analyses of coal, the results of laboratory tests, and of practical analyses arrived at by himself. His advice was to pay no attention to the printed analyses sent out, because it would be found they would never coincide with actual working results. The discussion on the paper was taken part in by Mr. L. Hislop (Uddingston), Mr. T. D. Hall, Mr. J. Whyte (Seaham Harbour), Mr. Gavin Paul (Edinburgh), Mr. J. Renfrew (Langbank), Mr. G. R. Hislop, Mr. D. Robertson (Dunoon), Mr. J. Ballantyne (Rothesay), Mr. J. M'Gilchrist, Mr. Robert S. Carlow, Mr. R. Cowie (Tillicoultry), Mr. J. Wilson (Dawsholm, Glasgow), Mr. A. Napier (Crieff), Mr. D. Bruce Peebles, Mr. A. Yuill (Alloa), Mr. P. Watson (Stirling), Mr. D. M. Nelson (Glasgow), Mr. P. Tocher, A.I.C., F.C.A. (Peterhead), and the President. Thereafter, Mr. M'Crae replied to the observations and criticisms which had been made upon his remarks. As the outcome of a suggestion by Mr. M'Gilchrist, the Committee were asked to consider and report on the subject of arranging for analyses which would come nearer the value of the coal than can be obtained at present. Mr. M'Crae was thanked for his paper.

Mr. J. Mackay (Peterhead) read a paper on "Enriching Coal Gas by Paraffin Oil or Liquid Hydrocarbons," in which he stated that, in experiments he had carried out, he had been able to raise the illuminating power of 20-candle gas by 3·5 candles, using 12 or 15 gallons of oil per ton, and that the employment of oil effected a saving of 4¼d. per 1000 cubic feet. This paper proved to be too elaborate for the members to discuss there and then; and after Mr. T. D. Hall, the President, and Mr. Tocher had spoken, the discussion was postponed till next year—Mr. Mackay, however, receiving a vote of thanks.

Mr. G. Keillor (Nairn) contributed the concluding paper, on "How to Keep Down Complaints and Grumbling among Gas Consumers." His principal recommendation was that the meter inspector should attend to complaints on the spot. This might, he said, delay by a day or two the completion of the survey; but it often had the effect of keeping a customer. He narrated several instances in which he had, in this way, succeeded in overcoming complaints by consumers. Mr. Keillor struck a sympathetic vein among his hearers; and the discussion which followed was more spontaneous than any of the others. The speakers were Mr. J. B. Terrace (Brechin), Mr. P. Watson, Mr. J. Ballantyne, Mr. Whyte, Mr. Carlow, Mr. T. D. Hall, Mr. J. Carmichael (Barrhead), and the President. At the close, a vote of thanks was cordially passed to Mr. Keillor.

ELECTION OF OFFICE-BEARERS.

The SECRETARY intimated that the result of the ballot for the election of office-bearers was as follows:—

President—T. D. Hall, Montrose.
Vice-Presidents—James M'Gilchrist, Dumbarton; Lawrence Hislop, Uddingston.
Secretary and Treasurer—Robert S. Carlow, Arbroath.
Committee—A. Bell, jun., Peebles; S. Stewart, Greenock; R. Mitchell, Edinburgh; and A. Wilson, Dawsholm, Glasgow.

Mr. HALL thanked the members for the honour they had conferred upon him in electing him President. The position was not of his own choosing, as they were aware; but he would do his best to discharge the duties devolving upon him during the year. He knew that he would be supported, as all Past-Presidents had been, by an able Committee, as well as by their energetic Secretary.

PLACE OF NEXT MEETING.

The PRESIDENT intimated that the next meeting had been fixed by ballot to take place at Dundee.

* The full text of the papers, with a report of the discussions thereon, will be given in subsequent issues of the JOURNAL.

THE QUESTION-BOX.

Only one paper was placed in the question-box. It contained the following question: "Is it possible to thoroughly extract carbonic acid gas from Scotch cannel gas by purification with lime and oxide—two of the former, and one of the latter?"

The PRESIDENT answered the question straight off, as follows: Yes, thoroughly. The lime will extract every particle of carbonic acid; but you must not allow it to run on too long. Whenever the lime is thoroughly carbonated, you must change it; otherwise it will pass carbonic acid.

VOTES OF THANKS, ETC.

The PRESIDENT observed that, though they had thanked the readers of the papers individually, he thought it was incumbent upon them that they should do so collectively. While, as he had said, they improved the Association from year to year in usefulness, he was of opinion that on this occasion the papers had been of such a nature as fully to impress them with the value of the Association.

The vote of thanks was unanimously accorded.

The PRESIDENT then announced that the sculptor of the bust of Murdoch, which they were to unveil the next day, had sent a small, but exact copy of it; and he would provide other copies at two guineas each.

Mr. J. B. TERRACE (Brechin) said that The Gas Institute were applying for a grant from the money which was voted by Government to assist in research; and he thought it right that the Association should have a little of that money.

The PRESIDENT said the suggestion was a very important one, and well worthy of their consideration. He supposed they would leave it to the Committee to deal with.

This was agreed to.

Mr. T. D. HALL pointed out that, if they obtained any such money, it could not be added to their ordinary funds, but would have to be placed to the Research Fund.

Mr. R. ROBERTSON (Bathgate) said they had come to the close of a very interesting and profitable meeting, the whole business of which had been conducted in a most satisfactory manner. Mr. MacPherson had done all that a President could do in the way of conducting the proceedings. They were on the following day to perform a most interesting ceremony; and he was sure they were all very much gratified that they had someone like Mr. MacPherson to undertake the work. There was another important event which had occurred during the year; and he was sure they all congratulated Mr. MacPherson on the difference which had taken place in his position. He was not now standing alone, but with a helpmeet. He (Mr. Robertson) asked the members to accord Mr. MacPherson a hearty vote of thanks; and he had also to ask him to accept the medal which was presented by the Association to each President.

The PRESIDENT expressed his thanks for the vote, and for Mr. Robertson's kind words in proposing it. He said that since he became a member of the Association, it had been his endeavour to promote every interest connected with it, and to make it what it had turned out to be—a thoroughly useful Association, and one of which they were all justly proud. They met year by year; and he was sure the communication they had with each other was of the greatest benefit to them.

Mr. T. D. HALL proposed a vote of thanks to their worthy and energetic Secretary, Mr. Carlow. He said he had been associated with Mr. Carlow for a long time; and he could speak to what they all knew—how energetically and faithfully he did his work.

The PRESIDENT seconded the proposal; and it was cordially agreed to.

Mr. CARLOW, in acknowledging the vote, said his best reward was to see the members turning out to attend the meetings as they did. This was the greatest encouragement he had; and it gave him the utmost pleasure to do what he could to further the interests of the Association.

Mr. D. M. NELSON asked the members formally to record their thanks to Provost Kinross, as Chairman of the Stirling Gas Company, and to the Directors of the Company, for their reception of the Association, which had been done in a kindly and handsome nanner.

The PRESIDENT having seconded the proposal, it was very heartily approved.

This concluded the business of the meeting.

THE UNVEILING OF THE MURDOCH BUST.

This ceremony took place on Friday. As it was the *pièce de résistance* of the meeting, there was a considerable influx of members and others who had not been present on the previous day. Lord Kelvin, who performed the ceremony of unveiling, was accompanied by Sir Wm. Arrol, who is famous as one of the contractors for the Forth Bridge, Mr. Andrew Stewart, of Glasgow, &c. Major Murdoch, R.A., of Woolwich, and Mr. Wm. Murdoch, of Abergavenny, grand-children of Wm. Murdoch, and Mr. Alex. Murdoch, a grand-nephew of a brother of Wm. Murdoch, were also present. The company drove out from Stirling in the forenoon to the base of the Abbey Craig, in most magnificent weather, and, preceded by a piper and the burgh officers of Stirling in picturesque uniform, made their way on foot up the steep winding path which leads through charmingly wooded slopes to the top of the Craig. From here a magnificent

view is obtained of the town and Castle of Stirling, the cosily situated watering-place of Bridge of Allan, and on one side the fertile valley of the Forth, with the river winding its serpentine way seawards, while on the other side rise the rugged slopes of the Ochil Hills. The Wallace Monument, erected some twenty years ago by public subscription, to commemorate the name of Sir Wm. Wallace, the Champion of Scotland, is a tower of great height, in the Scotch Baronial style of architecture, erected on the summit of the Craig. To reach the Hall of Heroes—an apartment in which are already placed about a dozen busts of famous Scotsmen, and which is the middle of the three apartments, one above the other, which are all the accommodation the tower affords—the visitor has to climb a narrow circular stair, of some 100 steps, in semi-darkness. It was a bold thing to take more than 100 (probably nearer 200) ladies and gentlemen up and down this veritable Jacob's Ladder, in single file; yet the feat was accomplished without mishap. Lord Kelvin pluckily mounted the rather difficult staircase; and though the effort seemed to tell upon him, he soon recovered his breath, and spoke for over half an hour. Mr. MacPherson, the President of the Association, took the chair.

Provost KINROSS, of Stirling, as one of the Custodiers of the Monument, opened the proceedings by congratulating the Association on the successful result of their efforts to add to the attractions of the Hall, and on the distinguished guest they had brought with them.

Mr. MACPHERSON said that William Murdoch was one of Scotland's greatest sons; and some years ago the North British Association of Gas Managers felt it to be incumbent upon them to do something to perpetuate his memory, and they had collected a very considerable amount for the purpose of doing something worthy of his name. Their idea was to found a bursary in a University. Meantime, in this, the centenary year of gas lighting, they felt that they ought to recognize it, and they had resolved to place a bust of Murdoch in that Hall of Heroes. He was sure that Murdoch was well worthy of such a place. Next to the immortal Burns, he certainly was Ayrshire's greatest son; and a curious coincidence was that Murdoch and Burns were born within a very short distance, and within a few years, of each other. He had much pleasure in asking Provost Kinross to accept the bust as a gift from the North British Association of Gas Managers, to perpetuate the name of one whom they revered and esteemed; and he had also much pleasure in asking Lord Kelvin to unveil the bust.

Lord KELVIN, rising, thanked the Association for the great honour they had done him in confiding to him the honourable duty of unveiling a bust to Murdoch. (His Lordship then withdrew the covering from the bust—a proceeding which was followed by loud and prolonged applause.) Continuing, he said they saw before them the bust of William Murdoch, in the befitting company of Sir Walter Scott, Thomas Carlyle, James Watt, and of many men who had made Scotland what it is, in a place which commemorated the patriot soldier, William Wallace. They had also there a bust of the King and soldier Robert Bruce. They all knew what these had done to secure for Scotland the proud and happy position it now occupied as a member of the United Kingdom—the one and indissoluble United Kingdom of Great Britain. The soldier and the engineer were well associated in the Monument. William Murdoch was a man who had done great things, not only for Scotland and for England, where his life-work lay, but also for the rest of the world. He was born at Cumnock, in Ayrshire, in 1754. A most fitting memorial on this occasion, which might pass to others who had not been able to enter the walls of the Monument, was a little book entitled "Light Without a Wick," from which they would pardon him if he read a few extracts.* (Lord Kelvin then read a number of extracts from the book, accompanying them with a running commentary.) Murdoch's father, he said, invented iron circular gearing for millwrights' work, and had the first casting of it made at the Carron Iron-Works, then under Dr. Roebuck, the leading proprietor, who had entered into partnership with James Watt. This brought Watt into intercourse with those who had to do with the Carron Works, and was no doubt the initiation of the resolve which took Murdoch to the Soho Works in Birmingham. But before he went to Birmingham as a young engineer, Murdoch had shown wonderful inventiveness in his home in Ayrshire. He knew the country habit of increasing the light of a kitchen fire by throwing a piece of splint coal upon it. It was reported that Murdoch's first experiments were made with a tea-pot which he borrowed from his mother. Everyone had observed the gas sputtering out from a piece of coal. The inventor, instead of taking the jet from the coal directly, lengthened the pipe, and was able to have a number of burners; and there was the problem of lighting by gas solved. Murdoch's enthusiasm for gas lighting met with a great deal of cold water; and he was afraid he must confess that even Watt himself threw cold water on Murdoch's idea of applying gas for lighting houses and streets. But there was something besides gas which occupied Murdoch's inventiveness. He and his brothers made a wooden horse, on which he used to work his way to and from school. That might seem to be but childish play, but for the fact that it brought out that useful article, the tricycle; and no doubt his invention helped to bring out the bicycle and all the great industry which is now connected with it. Murdoch invented the locomotive steam-engine. He made a high-pressure steam-engine, and with it he actually went about from mine to mine; and it did seem to be very much because of so much objection, and, as he had said, cold water was thrown upon his idea, that he did not, by at least 20 or 30 years, anticipate George Stephenson in the great work which he had done. When he set out from Ayrshire for Birmingham—a journey now of about nine hours, it took him about a week to accomplish it—he wore a wooden hat, which he had turned for himself; and when he went to call upon Boulton and Watt, this wooden hat attracted Boulton's attention, and he thought, "Here we have a mechanical genius." He was taken into their employment, and sent to Cornwall. Gas lighting was that by which he was most known of all his inventions; but there was an important thing in connection therewith which might be borne in mind, and that was the invention of coal-tar products—the aniline dyes, which formed a very large part of the profits of a modern gas-works. So far-seeing was he, that in 1791 he took out a patent for these; but he was so much before his time that he never made any money by it. But he made the invention. Now they had two busts of Murdoch—one by Chantrey, and the one which he had just unveiled, of which they might say, as was said of the bust by Chantrey, that it perpetuated the memory of his well-formed head. He was sure they could not look upon the one before them without expressing their thanks to the artist for giving them it, it was so admirable a model. Turning to the artist (Mr. D. W. Stevenson, R.S.A., of Edinburgh), Lord Kelvin thanked him for producing so admirable a bust.

Dr. PATERSON, of Bridge of Allan, an old friend and admirer of Lord Kelvin, here presented his Lordship with a bouquet of orchid and rose blooms from the donor's garden.

Dean of Guild MILLER, of Stirling, on behalf of the Custodiers of the Monument, accepted the custody of the bust, and thanked the Association for it.

The CHAIRMAN said that, as they were later on to entertain Lord Kelvin at luncheon in Stirling, they would reserve their thanks to him till then.

This terminated the proceedings in the Monument; and the company, on reaching the ground, were photographed with the Monument for a background.

As stated above, the sculptor who prepared the bust is Mr. D. W. Stevenson, R.S.A., of Edinburgh. It is in white marble, and is a beautiful work of art. The inscription upon it is as follows:—

WILLIAM MURDOCH.

1754. 1839.

Inventor of Lighting by Gas, 1792.

1892.

The company drove back to Stirling, where luncheon was served in the Golden Lion Hotel; Mr. MacPherson, the President, being again in the chair. In acknowledging the toast of his health, proposed by the President,

Lord KELVIN said that, with reference to the great contest which had been referred to—between gas and electricity—he felt as if he was one against 150 in that gathering. The Chairman had said that gas managers were not afraid of the contest. He must say for his part he was not afraid of it either. Just as gas had succeeded without snuffing out the sun, the moon, and the planets, so he considered electricity would succeed without snuffing out gas. On the contrary, he believed there was a great future for gas; and while at the present moment he was in the unhappy position of being one for electricity among 150 "enemies," he might be permitted to say that if those connected with the gas interest would do as much for the electric light as the electric light had already done for gas, the fortunes of many would be made. He believed that already the electric light had doubled the consumption of gas in many places. Electricians had taught the world that it must have light, and more light; and the century of gas would be followed by one of more light, and more beautiful light. He claimed for the electric light that, if used economically, the cost would not exceed that of gas, although if they had such an efficient stop-cock for gas as they had for the electric light, it would be much more difficult for electric lighting companies to take the field from gas. Long after gas ceased to be used as an illuminant, it would continue to be used for power and heat.

The PRESIDENT proposed the health of Mr. M'Gilchrist, the Secretary and Treasurer of the Memorial Fund. He thanked Mr. M'Gilchrist for the able manner in which he had carried out his duties during the last ten years; and he asked him, in the name of the Association, to sit to an eminent artist for his portrait in oil, in recognition of his labours in connection with the fund.

Mr. M'GILCHRIST returned thanks, and accepted the gift of the Association.

Mr. Wm. Murdoch, of Abergavenny, exhibited a gold box which was made from the medal presented to his grandfather in 1808, by the Royal Society of London, for a treatise by Murdoch on his "application of the illuminating properties of carburetted hydrogen gas to the purpose of furnishing a new and economical light."

After luncheon the company drove to Doune, and returned to Stirling in the evening—most of them doubtless tired with their hard day's work, but all delighted with the outing.

* This book was noticed at length in the JOURNAL for May 3 last, p. 791.

MR. W. J. DIBDIN ON STELLAR PHOTOMETRY.

Readers of Mr. W. J. Dibdin's "Practical Photometry" will no doubt remember that he devotes the concluding chapter to a consideration of the question of stellar photometry. At the time the book was passing through the press, the author was engaged upon a series of observations, the results of which he said he hoped shortly to publish. This he has now done; his further contribution to the literature of this interesting subject having been made in the shape of a paper, which has been communicated to the Royal Society by Mr. Vernon Harcourt. We have been favoured by Mr. Dibdin with an abstract of the paper as it appears in Vol. LI. of the Society's Proceedings; and we reproduce the principal portions of it below.

Hitherto the determinations of stellar luminosity have been made solely with regard to the relative intensity of the stars apart from any reference to a known terrestrial unit. The various methods which have been employed do not denote actual intensity; and the present inquiry was, therefore, undertaken with the view of elucidating this question, especially with regard to those stars whose colour has presented a difficulty.

As a preliminary, the author prepared a standard series of artificial stars of various colours and known intensity, in terms of the English standard candle. These range in value from 1 down to 0·000018 candle; and, when placed at a distance from the telescope, they form a standard series for comparison. The evaluation of the coloured lights was made by means of the author's modified "star" disc,* by the use of which comparisons of various coloured lights can be readily obtained.

The second portion of the inquiry was directed to the most suitable means of comparing a star with the standard. Such a method must provide for the estimation of the total luminous energy, irrespective of the fact that, in the case of a star, the light practically emanates from a point, while that from the standard emanates from a surface. This fact precludes the use of the wedge photometer.

The methods employed by the author were three in number. The first was by means of reflection from a plane mirror mounted in front of the telescope object-glass in such a manner that the light of one of the radiants is seen by reflection through one-half of the lens, while that of the other is viewed through the other half by direct visions; both radiants being thus simultaneously seen in the same field of view. When the two images are placed out of focus to a like extent, so as to be equal in size, comparisons of intensity can be made. By this system, it matters not whether the light emanates from a point or a surface, as it is the degree of illumination of the respective portions of the object-glass which is measured. Errors due to the unequal transmitting power of the different portions of the lens, and also those due to the loss of light by reflection, &c., are corrected by repeating the observations after the whole of the apparatus has been reversed—*i.e.*, if the star is seen by reflection in the first observation, it is to be viewed by direct vision in the second, when the standard light will be viewed by reflection.

The second method employed was a modification of Zöllner's lamp; the standard used being the author's pentane Argand burner, in which air carburetted with pentane is employed as a combustible. This is mounted on the eye-end of the telescope. Next to the burner is placed a plate of ground blue glass, carefully adjusted to reduce the colour of the gas-flame, so that it is, as nearly as possible, comparable with that of daylight. This glass is mounted permanently in front of an aperture, 0·08 inch in diameter, in a brass plate. At a distance of 2·4 inches from this is placed a second plate of brass, having an aperture 0·013 inch in diameter. A lens, fixed at 2 inches from this second plate, projects the image of the illuminated surface of the blue glass by a reflecting prism to the eye-piece of the telescope, in which it is viewed as a circular disc of light, side by side with that caused by the illuminated image of the telescope object-glass. The ground surface of the blue glass affords a slightly granulated appearance, exactly imitating that of the object-glass when a star is viewed out of focus. By arranging the position of the eye-piece until the two images are of exactly the same size, the imitation of a star is so striking that it is all but impossible, when the colours are alike, to discern the difference.

For the modification of the colour of the comparison light, two series of coloured glasses are arranged in rotating diaphragms situated between the two perforated plates 2·4 inches apart. These can be conveniently brought into position for modifying the colour and intensity of the comparison light. The coefficient of absorption of each of the coloured glasses was determined photometrically, and tables were prepared by reference to which corrections for their use can be made.

As this method was found to present an objectionable feature in regard to the uncertainty attending the use of multiple glasses for reducing intensity, the third method was employed. The lamp was placed in a graduated bar in such a manner that its distance from the ground blue glass could be conveniently altered, and the illumination of that glass reduced on strictly photometrical principles. This method was found to answer so well, that the experimental apparatus first employed is being altered and improved. When it is completed, a further and extended series of observations will be made.

Details of the observations are given in the tables presented with the paper. By plotting the average results on a diagram, a mean curve is drawn. From the value thus found, the relative intensity of stars of all other magnitudes can be calculated. It then only remains to convert the comparative into actual values by the correction for the distance of those stars whose positions are known, when their actual intensities will be ascertained.

In the abstract, there is given a series of the average results of the determinations of the intensity of a sequence of stars in descending order of brightness, together with their respective magnitudes, and a comparison of their theoretical intensities on the assumption that a second-magnitude star equals 0·00075 candle placed at a distance of 109 feet, which factor is deduced from the mean curve of all the determinations made.

The atmospheric absorption of light is discussed in the paper, and instances are given of the considerable diminution in the light of a star when no apparent cause was discernible to ordinary observation. Eight determinations of the light of Jupiter have been made; the average result being to ascribe to that planet a light equal to 0·020 candle placed at a distance of 109 feet. Determinations of the light of the planet Venus and of the Moon are also given; and the necessity for further observations is referred to.

The total quantity of light afforded by the stars (apart from the planets) is calculated from the results given in the abstract combined with Argelander's estimate of the number of stars down to the ninth magnitude. Assuming that the light afforded by these is equalled by the innumerable stars of lesser magnitude than the ninth, and by nebulæ, the total starlight will equal that from 1·446 candles when placed at a distance of 109 feet. If it be further assumed that only one-sixth of the stars are capable of illuminating a given surface at the same moment, then such illumination will be equal to that afforded by one standard candle placed at a distance of 210 feet.

* This is described in the author's "Practical Photometry," p. 83.

The Estate of the Late Mr. F. C. Hills.—The will of the late Mr. Frank Clarke Hills, whose death was announced in the JOURNAL for May 10 last, has lately been proved. It disposes of personal estate exceeding £1,942,000 in value.

The London Water Question.—We have received a copy of the little pamphlet on "The Supply of Water to London in the Near and Distant Future," by Mr. J. Logan Lobley, F.G.S., which was briefly noticed in the article on "Water and Sanitary Affairs" in the JOURNAL for the 24th of May last. It is a reprint, with additions, from the *County Council Times* (at the office of which, at 144, Fleet Street, it is published); and it has reached a second edition.

Railway Carriage Lighting by Gas.—By way of supplementing the statement recently made in the JOURNAL as to the extension of the Pintsch system of gas lighting on the Midland Railway, it may be mentioned that the Great Indian Peninsula Railway has recently completed oil-gas works on that system, and gas-lighted trains are working on the Bombay and Poonah line. Similar works have been provided on the Bombay, Baroda, and Central Indian Railway; and the first trains are running. The East Indian Railway Company have ordered the construction of several oil-gas works for Howrah, Allahabad, and elsewhere; and trains are to be furnished with gas-fittings on this line, on the Madras Railway, and on the Southern Mahratta Railway. It will now be possible to run trains provided with gaslight for three nights' consumption, or for the whole journey from Bombay to Calcutta.

North of Ireland Association of Gas Managers.—Reference has already been made to the forthcoming annual meeting of this Association, which will take place next Tuesday in the Exhibition Room of the Alliance Gas Company, Hawkins Street, Dublin, under the presidency of Mr. W. S. Stormonth, of Coleraine; and the programme of proceedings which we have received from the Honorary Secretary (Mr. J. Whimster, of Armagh) strengthens our opinion that the meeting will not fall behind any of its predecessors in point of interest. One of the papers to be read on the occasion will be by Mr. J. Robb, of Cinderford, who will deal with "Sudden Excesses of Sulphur Impurities in Connection with Lime Purification, and their Remedy;" and the other by Mr. P. J. Salmon, of Galway, who will discuss the question of "The Necessity of a Consulting Engineer for Small Works." The description by Mr. J. R. Wigham of his high-power lighthouse burner will be specially instructive, as it will in all probability take place at the Howth Lighthouse, where, as our readers are aware, his system of gas lighting has long been in operation. The lecture by Professor Tichborne will complete the items on the *agenda*. An opportunity will be afforded for visiting the Dublin Gas-Works during the day; and the members will dine together at Jury's Hotel, College Green, in the afternoon. The efforts of the officials of the Association to ensure a good gathering have been seconded by the Great Northern Railway Company of Ireland, who have agreed to issue to members return tickets at single fares to Dublin from any station on their line, provided there are sufficient applicants. Those who desire to avail themselves of this concession should therefore, without delay, inform Mr. Whimster where they purpose joining the system.

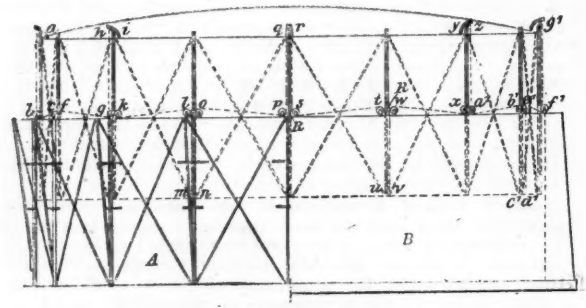
REGISTER OF PATENTS.

Guiding Gasholders.—Intze, O., of Aix-la-Chapelle, Germany. No. 16,643; Aug. 29, 1891.

The claim made by the patentee in respect of this invention is for a system of vertical guides for single or telescopic gasholders, in which a number of ropes or chains are symmetrically arranged in successive sections, and run downwards from the top of each lift, then in an approximately horizontal but alternately opposite direction over pulleys fixed to the top edge of the tank or of the next lower lift, as the case may be; and then again downwards to the lower edge, whereby the strains caused by the ropes or chains on the holder can be counteracted by the introduction of a diagonal bracing in the inner side of the holder.

In the words of the patentee: The devices hitherto employed for guiding the cylinders of gasholders, and in which ropes or chains arranged all round the cylinders of the holder are employed, are not suited for vertically guiding the cylinders and at the same time securing them against wind-pressure from any direction. They cannot, therefore, in the proper sense of the term, be considered as vertical or parallel guides. Vertical guides in which ropes or chains pass over the top of, and underneath the holder present many obstacles and dangers in working, and prevent easy access; while in case of a breakdown of some parts of the arrangement, especially during a storm, the top cylinder is liable to tip over, and this latter may happen to any of the known so-called rope or chain guides. In order to obviate these disadvantages, and to obtain a perfect system of vertical and parallel guides which will effectually resist the wind-pressure from any direction, a number of evenly disposed chains or ropes are arranged in pairs around the gasholder, which ropes or chains are not connected together, but in their joint action form a perfect parallel guide for the gasholder, even if some of the ropes or chains should become destroyed. The strain caused by the chains or ropes can be resisted by employing internal diagonal bracings in the cylinders. Whatever may be the direction of the wind-pressure, one-half of the whole number of sections of rope or chain are always brought into a state of tension; the sections exposed to the action of the wind being those which actually supply the resisting force to the cylinder of the gasholder.

To secure this effect, two adjacent sections of chain or rope which connect the upper edge of the cylinder of the holder with the lower edge of the same, are symmetrically arranged, and are led over firm rollers—that is to say, they alternately descend from the upper edge to the lower, and rise from the lower edge to the upper one. The effect of any force, which must always miss one stretch of the sections of chain or rope which are regularly and consecutively stretched, is transmitted in the stretches so missed to the cylinder, by a suitable coupling. By this arrangement, it is possible, in consequence of the easily effected and equable stretching of all the sections of rope or chain, to reduce the oscillations of the cylinder of the holder under the influence of changes of direction of, and sudden variations in, the pressure of the wind to an insignificant point. The horizontal force of the wind can thus, after all its impulsive effect has been taken up by the one-half of the sections of chain or rope, be transmitted either by means of fixed rollers to the upper edge of the tank, or by moveable rollers to the lower edge of the cylinder, or by fixed tangential rollers on the upper edge of the tank to the latter itself. In order to render the cylinder of the holder and also the edge of the tank easily accessible, all the sections of rope or chain and the rollers are arranged in proximity to the casing of the cylinder and of the tank.



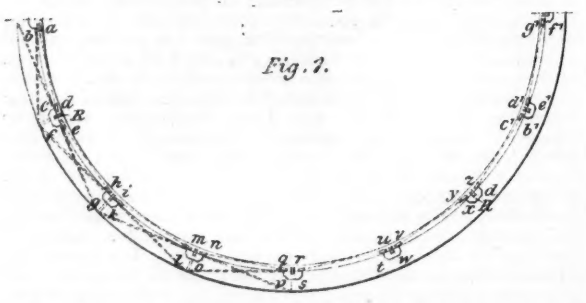
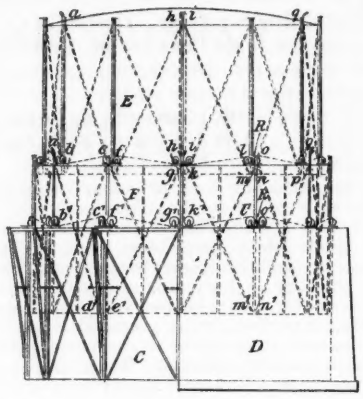


Fig. 1.

Fig. 1 shows an elevation of such a system of guiding by means of symmetrically-arranged sections of rope or chain; the left-hand side of the figure illustrating its application to a holder having an iron tank A, and the right-hand side illustrating its application to a holder having a tank B of masonry—the holder in both cases having a single cylinder, shown half raised. The first section to the left passes from *a* on the upper edge of the cylinder over a fixed pulley *b* on the edge of the tank; from thence over a fixed pulley *c* on the edge of the tank; and to *d* on the lower edge of the cylinder. The adjacent symmetrical section begins at *e* on the lower edge of the cylinder; passes over a fixed pulley *f* on the edge of the tank; from thence to the fixed pulley *g* on the edge of the tank; and then to *h* on the upper edge of the cylinder. The succeeding section of chain or rope to g_1 runs in a similar symmetrical manner; and so on round the back of the cylinder to the point adjacent to *a* on the upper edge of the cylinder. The lower half of the figure shows the course of the symmetrically-arranged sections of chain or rope in a ground plan similarly lettered.



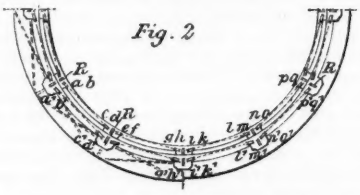


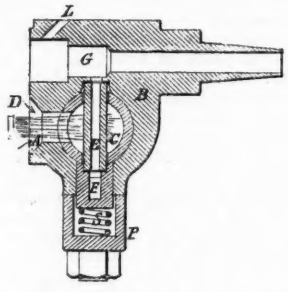
Fig. 2.

Fig. 2 is a similar view to fig. 1 of a telescopic holder, and illustrates a similar symmetrical arrangement of the sections of rope or chain; the left-hand half of the figure showing the holder provided with an iron tank C, and the right-hand half with a tank of masonry D—the upper lift E being shown fully raised, and the lower lift F half raised. In the upper lift E, for instance, the sections *a* to *q*, and so on, pass over the corresponding pulleys *b* and *c*, *f* and *g*, *h* and *l*, *o* and *p*, and so on, on the upper edge of the lower cylinder. On the lower cylinder F, the sections a_1 to q_1, and so on, are combined with the fixed pulleys b_1 and c_1, f_1 and g_1, h_1 and l_1, o_1 and p_1 on the edge of the tank. The lower part of the figure is a plan view, showing, by means of similar lettering, the position of the sections of rope and chain, and of the pulleys for the same respectively.

In both figures are also depicted the required pulleys R, necessary for the ordinary radial guiding of the cylinder, which are situated between pulleys of the above-described sections of rope or chain, and are directed radially. The diagonal bracings in the cylinders, for resisting the strain produced by the chains or ropes, are indicated by dotted lines.

Igniting Apparatus for Gas Motor Engines.—Holt, H. P., of Openshaw, Manchester. No. 10,437; June 1, 1892.

This invention relates to igniting apparatus for gas-engines, so arranged that the tube employed for producing ignition can be fully and rapidly heated and readily renewed.



As shown in the illustration, on the engine cylinder is fixed a block B, having in it a chamber C lined with asbestos or other refractory material which is a bad conductor of heat. Under or at the side of this chamber is fixed a Bunsen burner D, and round its flame, there is an annular passage A for the admission of air. Across the chamber C under a chimney a short tube E, preferably of ceramic material, is fixed, communicating with the cylinder directly or through the casing G of the ignition-valve, which (as shown) is of the kind descred in patent No. 3756 of 1888, and communicates with the cylinder by the passage L. The tube E may be itself open at both ends, and in communication with a separate chamber F; or the chamber F may be part of the tube, which in that case is made with a closed end. When no ignition-valve is used, the communication is direct from the tube E to the cylinder; the space F being in that case so proportioned that the ignition of the charge in the cylinder results from its compression forcing part of the charge into the space F through the heated tube E. The tube E has an asbestos washer at its open end, or at each open end; and it is clamped in its place by a helical spring, arranged in a cap P bolted on the block.

Screw-Couplings for Pipes and other Screw-Joints.—Folly, C. A. of West Hoboken, Flanagan, W. L., and Ward, De W. C., of New York. No. 8590; May 6, 1892.

This invention has for its object to render the couplings of pipes and other screw-joints liquid and gas tight. It consists in the combination, with the internally screw-threaded part of a screw-coupling having a circumferential groove cut in the threaded part for receiving a packing-ring, of lead or analogous material, of an internally screw-threaded packing-ring inserted in the groove, and made of smaller diameter than the internally threaded portion of the coupling. It also consists in an internally-threaded coupling having a lateral hole communicating with the circumferential groove, and containing a lead arm formed integrally with the packing-ring,or a screw inserted in the coupling and bearing upon the packing-ring for the purpose of taking advantage of the well-known property of the flow of metals for tightening the joint, either by forcing the metal in the lateral hole by means of a punch, or by forcing the screw placed in the hole into the packing-ring, thus causing the metal of the ring to flow around and closely fill the circumferential groove, and at the same time also to form an intimate contact with the externally threaded portion of the coupling.

APPLICATIONS FOR LETTERS PATENT.

13,117.—Clerk, D., "Improvements in gas or petroleum hammers, gas-pumps, gas punching, riveting, or cutting machines, in part applicable to gas or petroleum engines." July 18.

13,181.—Brownhill, R. W., "Automatic prepayment, sale, and delivery attachments for gas and liquid meters." July 19.

13,204.—Abel, C. D., "Gas and oil motor engines." A communication from the Gas Motoren Fabrik Deutz. July 19.

13,208.—Maltster, W., "Manufacture of sulphate of ammonia." July 19.

13,214.—Holt, F. W., "Fluid-meters." July 19.

13,228.—Thompson, W. P., "Water-meters." A communication from L. Valentin. July 19.

13,339.—Bailey, J. M., "Production of fuel gas." July 21.

13,363.—Gardner, L., "Gas-regulators." July 21.

13,398.—Lachmann, E., "Gas and lamp burners." July 22.

13,467.—Gibbons, B. and W. P., "Discharging gas-retorts." July 23.

13,470.—Jones, T. B., "Preventing choked ascension-pipes in the manufacture of coal gas." July 23.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

The Birmingham Fuel-Gas Project.

Sir,—I am afraid that, "in breaking out in a fresh place" (as mentioned in your issue of July 19), I have upset the equipoise of the editorial balance, which should always be suspended from an impartial, because anonymous, hand. With all deference, I may say that such an expression as "a mass of superfluous verbiage" may be tall-talk; but it is not the character of criticism that should emanate from a technical paper of the standing of the Journal of Gas Lighting. The report in question was not merely to suggest one method of initiating the distribution of a cheaper kind of fuel and power gas, but to prove that the advantages of so doing would be both real and substantial; and if your critic—taking the *motif* expressed into consideration—will kindly condescend to be more precise in defining what is superfluous, and what is not, it might add some weight to the measure of value of his criticism.

If he will read the report impartially and carefully, he will see that it consists in the proposal of a greater departure from existing practice than that involved in making a mixture of ordinary Birmingham coal gas with a non-luminous generator gas. The report says that even were the ordinary 17·4-candle gas distributed at a reduction on the price as charged for illuminating purposes, the benefits that would follow would be exceedingly great; and when it is considered that a general or house-to-house and factory-to-factory use of fuel gas would utilize the gas-producing plant and distributing mains in the *daytime*, the economic advantages of the step will be apparent.

The ideal fuel gas—if we accept Nature's natural gas example as the standard of perfection—is artificially produced fuel gas, of an analogous chemical constitution and thermic value to natural gas; and if my report is sufficiently luminous to make this fact understood, I shall be satisfied. The method of reducing the quality but (and in a greater relative measure) increasing the quantity of gas produced by the mixture of retort and generator gas, is one and the handiest method of approaching the constitutional character of natural gas; and a step further would be to adopt a high-pressure system of gas distribution. This method would be more appropriate for driving gas-engines, because anyone who knows the degree of absorption of gas by a large motor, realizes the effect that would follow the turning on or off of the gas from a small-bore low-pressure gas-service for such a purpose.

I am afraid your critic's calculating fibre must have become tangled, and the rule-of-three must have puzzled him; for he says I propose to distribute the gas under a pressure of from 4 to 8 inches of water. He had better refer to the report again, and he will see that the pressure proposed would vary from 4 to 16 inches—in fact, the maximum pressure the mains would stand without leakage is limited to within 50 lbs.; and any pressure up to this could be used.

Your critic makes a definite and clearly-expressed statement, "that producer gas is as *bad as air* in its effect upon illuminating power; and he ventures the assertion that I may contradict this statement. I do so; and I challenge your critic to bring forward a single proof in support of this remarkable assertion. Let him name his expert, who shall have ascertained the facts by means of direct experiment. Otherwise your readers may be critically fastidious, and refuse to accept your proofs. No, Mr. Critic, an assertion of this kind destroys any value that your criticism might otherwise have had.

Probably a short statement of my own experience may not be worth much in your view; but some of your readers will perhaps care to note the remarks. Whilst making oil-enriched generator gas, I have several times had accidental incursions of air into the generating plant. The result has been to lower the photometric value, although the weight of enriching agent added was constant; and the volume of generator gas displaced by the air was equal to that of the former. So that here is a positive proof—confirmed by the fact that, when the leaks were made up, and the incursion of air was stopped, the illuminating value attained its higher standard—that the diluting influence (in lowering the illuminating power) of air is very much greater than that associated with generator gas.

Recently I had the opportunity of testing the influence of generator gas as a diluent. The addition of 30,000 cubic feet of generator gas to 40,000 cubic feet (approximative) of retort gas, of a value of about 14-candle gas, lowered the photometric value, approximately to 8 candles. The photometric (jet) test actually registered 10 candles; but complete diffusion had not been obtained. Had the same ratio of *air* volume been added to the volume of retort gas, the illuminating value would have been reduced to *nil photometric value*.

I take it that, as generator gas has a thermic value of say 180 British thermal units, and that air has no thermic value, that generator gas (especially if produced from slack coal) is, in some ratio not yet absolutely defined, very greatly less diluent in its effect on photometric value than air. In my own calculations, I take the diluent measure of a gas as being a function of its thermic value.

The malign influence of nitrogen *per se* is much exaggerated; and in this connection, I must draw the critic's attention to Professor Foster's exact analytic experiments, and also to the statement of Mr. G. E. Davis (*ante*, p. 116). He will there find the analysis of a gas of 13·6-candle power, in which there is 13·9 per cent. of nitrogen, and 2·1 per cent. of oxygen. The diluting influence, I contend, is not so much the nitrogen *per se*, as the free oxygen, which, when added to the gas in explosive proportion, would absolutely destroy luminosity, as it does in the Bunsen flame. If nitrogen were such a diluent, its preponderating proportion, in the atmosphere would prevent combustion; but, by some electrical law of repulsion, the nitrogen is, as it were, effaced, leaving the oxygen free play to act in the *rôle* of oxidation.

In generator gas, the weight-ratio of oxygen to the nitrogen is practically *nil*; whereas in air the ratio is $-\frac{1}{3}$. So that the diluting influence of air, measured on this basis alone, is 3·35 times greater than generator or producer gas.

My report may be windy, and I hope bracing; but if it blows away the cobwebs of prejudice, and clears the ground for a wider and better development of the application of combustible gas, its wind power will not have been a form of dynamic energy uselessly applied. Your critic says that there is no stable foundation for the imposing evidence of phrases I build up. There is more evidence in favour of the proposals made in my report than is given by him in support of the contentious statement, that producer gas is as bad as air in its influence as a diluting agent. In support of all his critical remarks, there is absolutely no basis of proof put forward beyond his own opinion.

He says that the Birmingham compressed-air scheme was more soundly based. Here is another opinion without a shadow of proof. Some five years ago, I think, when Mr. Sturgeon was giving a description of the Birmingham compressed-air project, I showed that the low efficiency of air, over long distances, especially in comparison with electric transmission of energy, would be fatal to its success. *Verb. sap.* Although the compressed-air system of power supply may be valuable for some applications—such as postal and horologic work—it is not a system that I consider to be economically sound, whether in fuel or financially; and it will certainly not compare with fuel and power gas, whatever your critic may say to the contrary.

He is again wrong in inferring that I do not contemplate a comparatively high-pressure gas-distributing system. The reduction of pressure to 16 inches of water (maximum) was made after a thorough discussion with Mr. Dugald Clerk. There is no reason why the gas-pressure in the welded mains should not be increased to any reasonable extent, and reduced to the pressure desired at the *locale* of use, by regulating-valves, as is usual in natural gas distributing systems.

Mr. Dugald Clerk makes the following positive, and not general, nor qualified, statement: "That high illuminating power is quite unnecessary; and by dispensing with the greater proportion of the illuminating power, the whole of the coal may be converted into gas, and the production of coal avoided. At the same time cheaper coal could be used than is at present found necessary. The distribution of motive power by inflammable gas is by far the most economic system at present known; and is incomparably better than any compressed-air or high-pressure water scheme." These are not, it will be seen, qualified or vague statements, nor are they superficial ones; and everyone of them can be adequately proved if the opportunity is given.

Your critic winds up by a paragraphic dissertation on the laws controlling the advance of material civilization. I agree with him in his observation that it is the concrete experience that tells. But *without initiation*, how and where should we get the experience? Neither Mr. Dugald Clerk nor myself are responsible for the fact that there is no historic story of concrete experience to tell. Gas motors have only quite recently been reduced to such a price as to enable the majority of power users to purchase them; and there is so far no precedent of gas companies supplying their customers with gas-engines on the hire system. There has not been any precedent for the distribution of cheap low illuminating and fuel power gas (except of the natural character at Pittsburgh), for motive power and domestic and industrial heating purposes, and for driving dynamo machinery in electric lighting stations.

I must remind your critic that economic results do not follow immediately on the steps of a new departure. It did not in the early introduction of gas lighting. I need not tell the story of the early attempts at distributing electric lighting energy; it is, alas! too well written on the hearts of many poor shareholders. In Birmingham, however, the financial risk of carrying out the project under consideration would be a mere bagatelle. The distributing-mains of sufficient length for a test actually exist; and if, in the first instance, the present lighting gas *per se* was supplied to the mains, and at such a price as to enable householders and the artizans to use it, as well as the electric light companies, it would be a decided step in a direction

that will lead the great gas industry into a field for which it is pre-eminently fitted.

Your critic pertinently asks what advantages does Birmingham offer over any other place. They may be summarized as follows: 1st. The existence of perfectly constructed mains that will permit pressures up to 50 lbs. to the square inch to be maintained. 2nd. The character of the staple Birmingham industries requiring small furnaces and small power generators. 3rd. The removal of the smoke of Birmingham and with it the disfigurement of the architectural beauty of the very fine buildings that adorn this midland city. 4th. That as Birmingham was the site of the initiation of the application of retort coal gas for lighting purposes, it is in the highest degree appropriate that she should have the fortunate privilege of being able, at a small expenditure, to distribute fuel and power gas.

The first and second advantages constitute alone an adequate *raison d'être* for the project; and I am sure that every well-wisher and real friend of the gas industry will desire its practical realization, which would make gas the handmaid, and not the rival, to electricity in all its applications. *Industries*, to-day, in a leaderette on the project, writes thus: "This scheme will, we think, commend itself to all who are desirous that the gas undertakings in this country should extend their industry in the direction of supplying a gaseous fuel, rather than attempting to compete with the rapidly growing electric lighting companies. By adopting such a policy, they would really become the allies of their new rival."

There is no doubt that it would be better if the gas lighting companies would recognize once for all that the electric lighting rival is one that they will sooner or later have to cross swords with in a duel *à la mort* for the position of supremacy. It is easy to sneer at the suggestion of such a probability; but this course of procedure is neither dignified nor effective. Whatever the result may be of the coming struggle for supremacy in the field of artificial lighting, the gas industry has a resource that, until now, it has hardly drawn upon, but which, if properly utilized, will prove a far greater boon to our civilized life than even gas lighting has been—brilliant as are its records of benefits to man.

In my notes describing the Berthelot-Mahler calorimeter, before The Gas Institute, I suggested that it would be an advantage if the exact calorimetric values of different candle-power gases were determined with the calorimeter I described, or with my own modification of the Thomson. My friend, M. Pierre Mahler, will make these determinations with Continental qualities of gas; and Professor Foster or Professor Vivian B. Lewes will, I hope, accept the suggestion to make the calorimetric tests of British standard lighting gases.

I am very glad Professor Lewes has fallen in with the suggestion I made some time back, that the present standard of lighting value above 14·75 candles is not economic—involving, as it does, an expensive enricher. I hope he will not rest satisfied until he persuades the Parliamentary Photometry Committee to agree to the lowering of the standard. Dr. Samuel Rideal is also a strong advocate for the reduction. Once the standard is reduced to 14 candles, this alteration would *per se* be a step in the direction of cheaper fuel gas.

Before leaving your critic, I may say that, whether or not the proposal is accepted as worthy of a trial, I trust that the report may have some influence in encouraging the use of gaseous combustible for motive and heating purposes. It has been clearly shown—and I believe for the first time—that gas burnt in a gas motor and converted into dynamic and finally into electric lighting energy, is more efficient than the same gas burnt directly in a batswing or naked-light burner.

Liverpool, July 25, 1892. B. H. THWAITE.

[The above letter—which came to hand too late to appear in last week's issue of the JOURNAL—is referred to in our leading columns to-day.—ED. J.G.L.]

Southport Gas Supply.—At the last meeting of the Southport Town Council, the annual report of the Gas Engineer and Manager (Mr. J. Booth) was presented. It showed that the total quantity of gas sold during the year was 269,471,100 cubic feet; the increase over last year being 25,046,700 cubic feet, or 10·24 per cent. The gross profit for the year amounted to £13,536 14s. 5d.

Yeovil Gas Company, Limited.—The shareholders of this Company had their annual meeting on Monday last week, when the Directors reported that the profit on the year's working to June 30 last would allow of the payment of a dividend of 10 per cent., and the carrying forward of £1267. There was an increase of 1,851,000 cubic feet in the quantity of gas made in the twelve months; and the Directors attribute this to its increased use for cooking and heating stoves. With the view of further encouraging consumption, a reduction of 3d. per 1000 cubic feet has been made in the price, to take effect as from the 30th ult. This brings the figure down to 3s. 6d. net. The works (under the supervision of Mr. E. Howell) have been maintained in good working order.

Cleveland Water Company.—The report of the Directors of this Company has been issued, in view of the half-yearly general meeting to be held on the 10th inst. It states that the revenue of the Company has been reduced, owing to the strike of the Durham miners, which extended over a period of three months, and consequently caused a reduced consumption of water; but, after providing for interest, rents, and other preferential charges, there remains a balance of £2160, which will enable the Directors to recommend that a dividend at the rate of 5 per cent. per annum on the original and "A" shares, and 3½ per cent. per annum on the "B" shares (free of income-tax) should be declared, and that £150 should be added to the contingent fund. This will absorb £1780, and leave a balance of £380 to be carried forward. The statement of accounts by which the report is accompanied shows that the total increase in revenue for the six months ending June 30 last, as compared with the corresponding period of last year, is £311; but the balance brought forward from the previous half year being rather larger, while expenses and interest on calls together are practically the same, the net disposable balance is only £287 less than on the 30th of June, 1891, when the dividends declared were £6 and £4 4s. per cent.

MISCELLANEOUS NEWS.

INCREASED STOREAGE FOR THE GASLIGHT AND COKE COMPANY.

Inauguration of a Large Gasholder at the Kensal Green Station.

On Thursday, the 21st ult., a party of ladies and gentlemen assembled at the Kensal Green station of The Gaslight and Coke Company to witness the ceremony of inaugurating the three-lift gasholder which has just been completed. It was constructed by Messrs. S. Cutler and Sons, of Millwall and Westminster, from designs prepared by the Company's Chief Constructing Engineer (Mr. G. C. Trewby); the tank being the work of Messrs. John Aird and Sons. The diameter of the latter is 250 feet, its depth 55 ft. 6 in.; and its construction required 72,279 cubic yards of excavation, and 19,435 tons of concrete. It now contains about 10⅜ million gallons of water. The inner lift of the gasholder is 241 feet, the second lift 244 feet, and the third lift 247 feet in diameter; each lift being 55 feet deep. The capacity of the holder is 7½ million cubic feet. The height of the standards is 166 ft. 6 in. The work was commenced on Feb. 8, 1890; and therefore it extended over about 2½ years.

The visitors, who included the Governor of the Company (Colonel W. T. Makins), Mrs. Makins, and several of the Directors, Engineers, and officials, on arriving on the ground, proceeded to make a general inspection of the holder, after which they assembled in a pavilion which had been erected over the outlet-pipe, and here the ceremony of the day was gracefully performed by Mrs. Makins. Having previously received general instructions as to the opening of the valve, Mrs. Makins advanced towards the holder, which she proceeded to name "The Colonel," at the same time breaking a bottle of wine against its side amidst enthusiastic cheering. Mr. Cutler then presented Mrs. Makins with a polished oak box, mounted with a silver plate, having engraved upon it a suitable inscription, and containing a gold key for unlocking the padlock which secured the wheel connected with the valve. With this key Mrs. Makins released the lock; and the wheel which operated the valve automatically revolved, and the holder began to descend.

The visitors then partook of luncheon.

Mr. H. C. WARD (Deputy-Governor of the Company) having proposed the health of Mrs. Makins, and expressed the thanks of the Company to her for having performed the ceremony just witnessed,

Colonel MAKINS responded. He said it was 42 years since he first became acquainted with the works of the Company, and the same length of time since he and Mrs. Makins were linked together; and she had taken a more important part in its affairs than hitherto by performing the ceremony of the day. Speaking for himself and his colleagues, he said they regarded themselves as representatives of an important commercial undertaking, which was bound to consider the interests of its shareholders, and which was also entrusted with what might be regarded as a great public department, it being also called upon to provide light. As it was incumbent upon them to furnish an ample supply of gas, it was absolutely necessary that they should have sufficient storeage; hence the reason for the new holder just completed. It was one of the largest—in fact, it was the largest but one—that had been erected in England, or he might even say in the world. One could not tell how far it was possible to go with these engineering enterprises, in the face of the Forth and Tay Bridges, and also of the Tower Bridge. One could not predict what might be the future of gasholders; but the present structure stood well to the front. The officers of the Company were almost at their wits' end last winter to keep up the supply of gas; and consequently a large additional amount of storeage had to be provided. Unfortunately, as far as the site on which the visitors were assembled was concerned, they were very much hampered—having the canal on one side and the railway on the other; and if any further extensions were needed, they would either have to bridge over the former or annex the adjacent cemetery. He did not suppose they would be permitted to do the latter, as, not only legally but literally, the land was held in mortmain. The present, therefore, was the last great work that could be carried out at that station; but the Company had other places in the east where they would be able to put up a still larger holder than the one just completed at Kensal Green. The Governor then proposed the health of the Contractors, also of the Engineers (without whom, he said, the work of the Contractors would be impossible), especially that of the Company's Chief Constructing Engineer, who designed the holder. There was no doubt that, in these days, both Engineers and Contractors worked under great difficulties; but it must be acknowledged that they generally triumphed over them. The one great thing was time; and if they had the Directors behind them to provide these works beforehand, they, when called upon by the public, would be able to supply sufficient gas, however severe the winter might be. With regard to the Engineers generally, the question at present occupying their attention was the exact value of a pound of sperm or a ton of coal. When this was settled, they would be happy; but even if they failed to settle it, the public would not suffer. Words were inadequate to express the feelings with which the work done by the executive officers was regarded by his colleagues on the Board and himself. But above the Contractors and the Engineers, and above everybody except the Directors, was the Secretary and General Manager—his friend Mr. Phillips. That gentleman's long connection with the Company, and the interest with which from day to day he watched over and arranged its proceedings, rendered it quite unnecessary for him (Colonel Makins) to say much more, as to a great extent The Gaslight and Coke Company and Mr. John Orwell Phillips were one and the same. He would just say one word as to the gentleman who had charge of the station (Mr. M'Minn), because it was his duty, as a member of the Inspection Committee who visited the station, to be in constant communication with him; and he was bound to acknowledge that Mr. M'Minn devoted himself very thoroughly to the duties of his position.

The toast having been cordially received,

Mr. S. CUTLER, in responding for the Contractors, said he regarded

it as a great honour to be associated with the work which Mrs. Makins had so gracefully inaugurated; and he begged most respectfully to express his thanks to her. The work was certainly a very important one; and he hoped his firm might pardonably feel some pride in having carried it out. He concluded by thanking all present for the kind manner in which the toast had been received.

Mr. ELLIS (Messrs. John Aird and Sons) also expressed his thanks on behalf of that firm. Everybody knew, he said, that in carrying out such works as those of which they had now witnessed the completion, difficulties had to be encountered; but he was glad to say that, under the very able instructions they had received from Mr. Trewby, they had succeeded in producing a perfectly sound tank.

Mr. TREWBY, in acknowledging the toast, said he was much obliged to the company for the manner in which they had honoured it. The work now completed had been in hand about 2½ years. With reference to the Kensal Green works, prior to the recent additions, they were making there about 4 million cubic feet of gas per day; but with the increased retort plant, and with the help of oil gas, a total of 10 million cubic feet per diem would be reached. With respect to storeage, which was an exceedingly important matter, they were previously able to store 4½ million cubic feet of gas; but with the new holder, their capacity would be raised to 12 millions at this station. With regard to the producing power of the Company at all their stations, it was 114 million cubic feet of gas per day; their storeage capacity being 106 million feet. Taking the heaviest day last winter, they sent out 128 million cubic feet of gas; so that the provision made was not by any means too great in order that they might be in a position to cope with an increase in the consumption. Coming to the work that had just been inaugurated, he acknowledged his indebtedness to his assistants, and particularly to Mr. Randall, for the preparation of the drawings and for the help he had rendered in dealing with questions of strains. In work of this sort, it would not do to be content with things as they were done years ago. Every part had to be carefully calculated as to strength; and as far as this holder was concerned, they had no fear with reference to any gale that might take place. They believed that, as far as human foresight was concerned, the holder was strong enough to withstand any pressure that was likely to come upon it. He was looking forward to an opportunity of going to the top of the holder with Mr. M'Minn, to see how it would behave when the equinoxes came round. He concluded by thanking the visitors, on the part of the Engineering Department of the Company, for the way in which they had received the toast.

Mr. PHILLIPS, in responding on behalf of himself and his brother officers, expressed the hope that they might all see many more gasholders inaugurated.

The toasts of the healths of Mr. A. Stoneham and Mr. J. W. Field having been duly honoured, the former gentleman proposed continued prosperity to The Gaslight and Coke Company, which was duly acknowledged by Colonel Makins.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Report and Accounts.

The following report, with the accounts showing the working of the Company during the six months ending June 30 last (given on the next page), will be submitted to the proprietors at the half-yearly general meeting on Friday next:—

The accounts for the half year ending June 30 last show, after providing for all fixed charges, a profit balance of £350,032 9s. 2d., which enables the Directors to recommend a dividend at the statutory rate of 12 per cent. This will absorb £328,249 4s., and leave £21,783 5s. 2d. to be carried forward as undivided profit.

In the first half of 1891, the increase in the sale of gas, owing mainly to prolonged frost and the prevalence of dark and foggy weather, amounted to 9·55 per cent. In the past half year, during which there has been hardly any fog, and but little frost and cold, there is a decrease of nearly 3 per cent.; making the average increase for the two half years 3¼ per cent., which is nearly the normal rate taken over a series of years.

The trade in residual products has been languid, and prices have seriously declined. Until a general revival of trade commences, better results cannot be looked for. A diminution in the outlay for coal has, however, covered the loss on residuals; besides which there has been a satisfactory decrease in carbonizing wages.

The delivery of coal from the Durham coal-field was suspended for three months, owing to the strike which was notified to the Company on the 12th of March. In order, therefore, to supplement their stock (which was fortunately larger than usual), the Directors were compelled to make purchases from other sources till deliveries were resumed. The excess in cost over contract prices thereby incurred was £10,437. This amount has, with the approval of the Government Auditor, been charged to the insurance fund, as provided by the Company's Act of 1876. The Directors abstained from entering into fresh coal contracts till the labour disturbances in Durham had subsided; but they have now invited tenders for supplies which they hope to obtain at a reduction from the late high prices.

In pursuance of the Company's Act of 1870, notice has been given to the consumers of 20-candle cannel gas, the price of which is fixed by the sliding scale at 3s. 10d. per 1000 cubic feet, that, from the 30th of September next, the supply will be discontinued, and that 16-candle gas at 3s. 1d. will take its place. This course has become necessary owing to the scarcity, and consequent prohibitive price, of high-class cannel coal. The increasing use of gas for fuel has rendered a highly illuminating and expensive gas unsuitable to the present day requirements of London; while the improvements in gas-burners have tended to raise the efficiency of 16-candle gas, which will henceforward be the only gas supplied by the Company. The proposed change has been received with general satisfaction in the district supplied with cannel gas.

The appeal of the Company against the rateable value of their property, as fixed at the last quinquennial valuation, has resulted in a reduction in their assessments equal to a saving in parish rates of about £10,000 per annum for the next five years.

To provide for the completion of works now in progress, and for additions which experience shows will probably become necessary to meet the gradual expansion of the Company's business, the Directors will apply to the proprietors for authority to create, and from time to time, as required, to issue, ordinary "A" stock to the further amount of £150,000.

The Engineers of the several manufacturing and distributing departments have certified to the Court of Directors that all the plant of the Company under their charge respectively has been maintained in full efficiency during the past half year.

Following the report is the statement of accounts. As usual, we merely indicate the alterations that have taken place in those portions which are not subject to much variation; giving the rest in full.

Nos. 1 and 2 are the statements of stock, share, and loan capital, the totals of which on June 30 last were as follows: Stock and share capital, £8,579,000; loan capital, £2,444,000. These amounts stand as on June 30 last year.

No. 3 is the capital account, the receipts on which also stand as on June 30, 1891—viz., £11,795,400. The expenditure is shown in the following items:—

Expenditure to Dec. 31, 1891			£10,988,048 17 1
Expenditure during the half year to June 30, 1892, viz.:—			
Lands acquired, including law charges	£975 4 0		
Buildings and machinery in extension of works	116,634 7 4		
New and additional mains and service-pipes	20,342 12 6		
Do. do. meters	828 10 2		
Do. do. stoves	1,613 18 6		
	£140,394 12 6		
Cr. By sale of surplus land	£2133 6 7		
By depreciation of meters	4160 0 0		
Do. do. stoves	4680 0 0		
	10,973 6 7		
			129,421 5 11
			£11,117,470 3 0
Balance of capital account			677,929 17 0
			£11,795,400 0 0

Nos. 4 and 5 are the revenue and net revenue accounts. These are given in full on the next page.

No. 6 is a statement showing how the Directors propose to appropriate the balance applicable for dividend. It is as follows:—

June, 1891.		
£195,746 ..	Net revenue for the half year	£350,032 9 2
159,845 ..	Amount to be withdrawn from the reserve fund	—
£355,591		£350,032 9 2
(13 per cent.)	A dividend on the ordinary stock—	
£355,591 ..	12 per cent. per annum on £5,470,820	328,249 4 0
	Balance carried to next account	£21,783 5 2

Nos. 7 and 8 are the reserve and insurance fund accounts. The former shows that the balance of the reserve fund on Dec. 31 last was £236,616 19s. 11d., which was increased to £238,974 6s. 1d. by the addition of £2357 6s. 2d., interest on the sum invested. The amount carried to the net revenue account was £121,372 18s. 6d.; so that the balance on June 30 last was £117,601 7s. 7d. The insurance fund stood at £88,322 3s. 8d. at the end of the year. This was increased, by the interest on the amount invested (£1180 16s. 4d.), to £89,503. But as £10,437 of this has been taken to compensate for the loss arising from the Durham miners' strike, as explained in the report, the balance on June 30 last was £79,066.

No. 9 is the depreciation account. It stood at £39,750 7s. 7d. at the close of the past year; and on June 30 last it had been raised to £40,347 by the addition of £596 12s. 5d. received as interest.

Nos. 10 and 11 are as follows; and Nos. 12 and 13 are given on the next page.

No. 10.—STATEMENT OF COALS USED, ETC.

Description of Coal.	In Store, Dec. 31, 1891.	Received during Half Year.	Carbonized during Half Year.	Used during Half Year.	In Store, June 30, 1892.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	297,946	731,328	936,140	2,445	90,689
Cannel	20,722	28,799	28,260*	—	21,261
Total	318,668	760,127	964,400	2,445	111,950

* In addition to this quantity, oil, the equivalent of 37,049 tons of cannel, has been used during the half year.

No. 11.—STATEMENT OF RESIDUAL PRODUCTS.

Description.	In Store, Dec. 31, 1891.	Made during Half Year.	Used during Half Year.	Sold during Half Year.	In Store, June 30, 1892.
Coke—tons	51,539	586,166	160,405	437,787	39,513
Breeze—tons	5,664	63,505	20,347	45,810	3,012
Tar—gallons	842,792	10,210,744	10,543,531	21,266	488,739
Ammoniacal liquor—butts	21,504	268,308	263,871	9,143	16,798

New Joint-Stock Companies.—A Company has been formed, with a capital of £20,000, in £10 shares, to acquire and develop certain patents relating to improvements in fittings for lamps. Its title is the "Life-Saving Lamp Extinguisher, Limited." Root's Petroleum Motor Syndicate, Limited, with a capital of £2000, in £1 shares, has recently been formed to purchase the patents relating to the motor specified in the title.

The Last of the Sutton Coldfield Gas Company.—At a meeting of this Company held on the 23rd ult., it was decided to voluntarily wind up the concern; and Mr. Mayes was appointed Liquidator. As our readers are aware, the mains and principal portions of the works have been disposed of to the Birmingham Corporation, who will take possession on the 29th of September. The works will then, we believe, be dismantled, and any surplus material put up to auction.

ACCOUNTS OF THE GASLIGHT AND COKE COMPANY FOR THE HALF YEAR ENDING JUNE 30, 1892.

No. 4.—REVENUE ACCOUNT.

Dr. Cr.

June Half Year, 1891.	To Manufacture of gas—	£ s. d.	£ s. d.	June Half Year, 1891.	By Sale of gas—	£ s. d.	£ s. d.
	Coals, including oil, dues, carriage, unloading and trimming (see Account No. 10)			£1,242,321	Common gas, per meter, at 3s. 1d. and 2s. 6d. per 1000 cubic feet.	1,352,570 7 6	
£902,074		746,341 15 7			Cannel gas, per meter, at 3s. 10d. per 1000 cubic feet	49,708 12 7	
	Salaries of Engineers and other Officers at works	10,827 3 6		50,437	Public lighting and under contracts—		
10,200	Wages (carbonizing)	169,582 6 5		68,505	Common gas	69,539 3 1	
193,394	Purification, including £17,084 8 6 for labour	36,178 3 6		2,582	Cannel gas (See Statement No. 12.)	2,583 0 7	1,474,401 3 9
45,362	Repair and maintenance of works and plant, materials and labour, less received for old materials, £2114 11s. 6d.	149,804 5 2		£1,363,885			
152,642			1,112,733 14 2	27,817	Rental of meters	..	28,850 0 0
	Distribution of gas—			7,409	Rental of stoves	..	8,221 2 3
	Salaries and wages of Officers (including Rental Clerks)	24,614 11 2		313,338	Residual products—		
23,870	Repair and maintenance of mains and service-pipes	23,990 6 1		7,591	Coke, less £42,111 12s. 3d. for labour, &c.	217,349 12 10	
28,753	Repair and renewals of meters	22 425 3 2		121,484	Breeze, less £3297 7s. 10d. for ditto	4,982 1 10	
17,792	Stove fixing, repairs, and renewals	17 490 9 2		82,667	Tar and tar products	82,092 8 4	
21,734				3,981	Ammoniacal liquor and sulphate of ammonia	73,188 8 9	
	Public lamps—		88,520 9 7	227			377,612 11 0
	Lighting and repairing	16,342 6 4		300	Rents receivable		4,036 14 5
16 368	Experimental street lighting	91 17 3			Transfer fees		280 3 0
165			16,434 3 7		Canteen account		300 0 0
	Rents, rates, and taxes—						
	Rents payable	3,228 16 6					
2,927	Rates and taxes	71,654 4 4					
78,141			74,883 0 10				
	Management—						
	Directors' allowance	2,750 0 0					
2,750	Company's Auditors	200 0 0					
200	Salaries of Secretary, Accountant, and Clerks	8,756 12 1					
8,133	Collectors' commission	14,610 0 9					
14,668	Stationery and printing	4 314 10 8					
4,248	General charges	1,989 12 4					
1,914			32,320 15 10				
1,984	Parliamentary charges	..	2,187 17 6				
	Law charges (including Surveyors' charges *re* Quinquennial Valuation)	..	6,720 15 1				
1,633	Bad debts	..	8,595 16 6				
7,077	Annuities	..	9,980 14 6				
10,048							
	Public Officers—						
	Gas Referees and Official Auditor	829 18 9					
1,121	Public testing-stations	734 11 6					
780			1,564 5 3				
£1,547,923			1,354,241 12 10				
380,726	Balance carried to net revenue account, No. 5		539,413 2 4				
£1,928,649			1,893,654 15 2	£1,928,649			1,893,654 15 2

No. 5.—NET REVENUE ACCOUNT.

Dr. Cr.

June Half Year, 1891.		£ s. d.	£ s. d.	June Half Year, 1891.		£ s. d.	£ s. d.
	To Interest on debenture stocks and bonds, accrued to June 30, 1892	..	62,659 12 6	£209,895	By Balance from last account	206,876 5 6	
£62,660	Dividend on the preference stocks	74,084 10 0		145,696	„ Amount withdrawn from Reserve Fund	121,372 18 6	
72,539				355,591			328,249 4 0
47,500	Dividend on the maximum stocks	47,500 0 0			Less dividend on the ordinary capital for the half year to Dec. 31, 1891	..	
			121,584 10 0	355,591			328,249 4 0
2,281	Interest on temporary loans and sundry funds	5,186 10 8		380,726	„ Revenue account (No. 4)	..	539,413 2 4
195,746	Balance applicable to the payment of dividend on the ordinary stock	350,082 9 2					
£380,726			539,413 2 4	£380,726			539,413 2 4

No. 12.—STATEMENT OF GAS MADE, SOLD, Etc.

Description of Gas.	Quantity Made.	Quantity Sold.			Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
		Public Lights and under Contracts (estimated).	Private Lights (per Meter).	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	9,969,761	488,689	8,832,866	9,321,555	135,741	9,457,296	512,465	49,532
Cannel	294,499	15,837	259,349	275,186	2,402	277,588	16,911	2,186
Total	10,264,260	504,526	9,092,215	9,596,741	138,143	9,734,884	529,373	51,718
June half year, 1891	10,731,147	500,037	9,390,093	9,890,130	134,286	10,024,416	709,731	51,407

No. 13.—GENERAL BALANCE-SHEET.

Dr. Cr.

June Half Year 1891.		£ s. d.	£ s. d.	June Half Year 1891.		£ s. d.	£ s. d.
£	To Capital—			£			
	Balance at credit thereof	..	677,929 17 0	186,086	By Cash at Bankers	..	182,911 10 9
986,781	Net Revenue—			350,000	Amount on deposit at interest	..	300,000 0 0
	Balance at credit thereof	..	350,082 9 2		Amount invested—		
195,746	Reserve Fund—				2¾ per Ct. Consolidated Stock £201,702 3 7	..	203,566 5 1
	Balance at credit thereof	117,801 7 7		518,208			
391,974	Insurance Fund—				Stores on hand, viz.—		
	Balance at credit thereof	79,066 0 0		168,322	Coals	107,387 16 2	
87,131			196,667 7 7	23,679	Coke	18,784 14 11	
	Depreciation Fund—			79,452	Tar and ammoniacal liquor and products	59,903 11 1	
	Balance at credit thereof	..	40,847 0 0	211,499	Sundry stores	224,922 17 10	
39,163	Interest on debenture stocks and bonds, due on June 30, 1892	..	62,659 12 6				411,059 0 0
62,660	Preference and maximum dividends due on June 30, 1892	..	121,584 10 0		Accounts due to the Company, viz.—		
120,039	Unclaimed dividends due on June 30, 1892	..	10,666 18 6		Gas and meter rental—		
10,671	Sundry tradesmen and others, for amount due for coals, stores, and sundries	..	271,856 7 11	544,074	Quarter ending June 30, 1892	557,216 13 3	
				23,165	Arrears outstanding	27,207 16 8	
259,316							584,424 0 11
1,667	Benevolent Fund	..	1,667 6 8	33,108	Coke and other residual products	31,138 5 4	
				17,500	Sundry accounts	20,241 18 3	
							51,380 3 7
2,155,088			1,733,341 9 4	2,155,088			1,733,341 9 4

BRENTFORD GAS COMPANY.

The shareholders of this Company will hold their half-yearly meeting next Friday. The report and statement of accounts which will then be submitted show that the sum of £49,817 is available for division. The Directors therefore recommend the declaration of a dividend at the rate of 5 per cent. per annum on the 5 per cent. preference stock; at the rate of 12½ per cent. per annum on the consolidated stock; and at the rate of 9½ per cent. per annum on the new stock, 1881. The report announces that the new gasholder at Southall has been successfully completed, and is working satisfactorily; and also that the appeals against the new assessments have been withdrawn, having been settled by mutual agreement. The general and prolonged strike in the northern coal-field has, of course, affected the working of the Company during the half year. The Directors have been compelled to purchase coal which has been both higher in price and inferior in quality to that contracted for; and this, in addition to the depreciation in the value of residuals and the increase in rates and taxes, has made the accounts for the past six months unfavourable. The advance in the cost of coal and the continuous and prospective fall in the value of residuals, and the increased charge for rates and taxes, will compel the Company to raise the price of gas as from Michaelmas next; but this the Directors hope will be only temporary. They regret being compelled to take such a step at all; their great object being, they say, to sell gas at the lowest price they reasonably can. The burden, however, will be shared by the proprietors, whose dividend, under the sliding scale, will, for the time be proportionately diminished. The Directors further state that the sale of £30,000 of new 1881 stock realized £45,985 14s. 6d.; the whole amount having been tendered far above the minimum price named in the conditions. Turning to the accounts, it is seen that there is a drop of nearly £2000 in the revenue; and this is caused entirely by the residuals. The sale of gas produced £84,122, as against £82,421 in the corresponding period of last year—being an increase of £1701. Meter and stove rental amounted to £3711, as compared with £3489; while residual products yielded £23,348, against £27,081. Rents (£81) and transfer fees (£11) stand at about the same figures as at June last year. The total revenue is £111,274, as against £113,085. The other side of the account shows that £70,871 was spent in the manufacture of gas; £6657 in distribution; £1367 in lighting and repairing public lamps; £4346 in rents, rates, and taxes; and £3832 in management—smaller items bringing the total expenditure to £88,297; being about £2000 more than in the June half of 1891. With regard to the manufacturing operations, 59,789 tons of coal were used (of which only 495 tons were cannel), as compared with 56,427 tons; the total amount of gas made being 602,416,000 cubic feet, as against 583,212,000 cubic feet.

THE TODMORDEN LOCAL BOARD AND THE GAS-WORKS.

In the JOURNAL last week, we briefly recorded the decision come to by the Todmorden Local Board to acquire the works of the Todmorden Gas Company and those belonging to two firms in the district. The matter was settled, so far as the Local Board were concerned, at their meeting on the 20th ult., on which occasion the Gas Committee presented a long report on the subject. It set forth that the question had been under consideration since the previous October, when a Committee was appointed to enter into negotiations for the purchase of the whole or any of the gas interests in the district, with power to agree upon terms and incur any expense that might be necessary in obtaining particulars respecting the value of those interests. At one of their meetings, the Committee determined to obtain the fullest information possible as to the practicability of supplying electricity in the district, so as to ascertain the dangers which might result from this source of illumination if the Board decided to acquire the gas-works. A deputation accordingly visited the Crystal Palace Electrical Exhibition, and generally investigated the systems of electric lighting; the result of their labours being embodied in a report presented to the Committee on March 14. Of the three systems considered, the deputation favoured the direct-current transformer plan; but, on going into figures, they came to the conclusion that it would not be advisable to adopt it in Todmorden at the present time in preference to gas. In the first place, they said, a sufficient demand to necessitate the laying down of plant for the electric light would probably not be made for a considerable number of years; and also several electrical engineers whom they interviewed informed them that in any place where the light had been adopted, the consumption of gas had not decreased. After considering this report, the Committee decided to have an interview with the Directors of the Gas Company, to ascertain the lowest price they would accept for their works. Accordingly, one took place on the 23rd of March last; and, after considerable negotiations, the Committee made an offer of £76,862 10s. to the Company (they being allowed to pay the back dividends amounting to £1647 10s. 6d.) for all their assets, rights, properties, and powers, subject to minor details being arranged, and, of course, to the sanction of the Local Board, the ratepayers, and the Local Government Board, and to confirmation by Act of Parliament. The Directors, after announcing that they were not then prepared to accept the offer, retired, and negotiations were suspended. On the 30th of March, however, the Clerk received a letter from the Secretary of the Company accepting the offer. On the following day, an offer of £20,000 was made to Messrs. Fielden Bros., Limited, for their gas-works; and it was accepted. On the 4th of April, the Directors of Messrs. Wilson Bros., Limited, owners of the Cornholme Gas-Works, were interviewed with a similar object; and eventually, on the 3rd of May, it was decided to give them £6500 for their gas-works. The total amount of the purchase-money for the three works and powers is £103,362 10s.; being equal to about 18½ years' purchase of the average profits. From information supplied to the Committee, it appears that the average profits of the three Companies for the last three years amount to £5588 10s. 6d. per annum. The Committee estimated that a capital sum of £110,000 would be required to pay for the three works, including parliamentary and other expenses; and that the above profit would give an income of upwards of 5 per cent. thereon. It appears the sales of gas for last year were 63,446,300 cubic feet. The returns also show a steady increase for each of the last three years. The Committee considered the terms accepted by the three proprietors to be favourable for the interests of the ratepayers of the district; and they advised the Board to sanction the proposed purchases. The advantages to be realized were stated to be as follows: (1) A saving to the consumers in several parts of the district, by reason of the reduction in the price of gas to the uniform rate of 3s. 2d. per 1000 cubic feet. (2) A saving to the ratepayers generally of from £800 to £1300 a year, depending upon the rate of interest to be paid upon the amount borrowed to complete the purchases. (3) The gas being all manufactured at one place, the working expenses would be more economical; thus further increasing the profit to the ratepayers. (4) From numerous inquiries the members of the Committee had made, they were satisfied that there was every probability that, if the works became vested in the ratepayers, the sales of gas will grow at a more rapid rate than at present, and so augment the profits. (5) That, in addition to the advantages above mentioned, the works would become the property of the ratepayers in 50 years, free of cost. The Chairman of the Committee (Mr. Jackson) submitted a formal resolution sanctioning the purchase; and, in so doing, remarked that he and his colleagues were perfectly unanimous in their recommendations. As to the prices proposed to be paid, he thought they would bear favourable comparison with those for which any transfer of a gas undertaking to a local authority had been made in recent years. In fact, the number of years' purchase on the profits realized was considerably less than in any case the Committee had been able to find. Alderman Hoyle seconded the motion. Mr. Sutcliffe thought that the report of the Committee should be considered by the ratepayers, so as to allow them to form an opinion upon the question, before any further progress could be made. He therefore moved, as an amendment, that the report should be printed. The Chairman reminded him that certain parliamentary powers would be required; and these could not be obtained without the sanction of the ratepayers. Therefore, if the motion was carried, nothing could be done without their permission. Mr. Starkie seconded the amendment, which, however, on being put, was lost. Mr. Jackson then replied generally to the remarks made on the subject under discussion; and the original motion was carried *nem. con.* Subsequently the Committee were empowered to take the necessary steps for completing the purchases.

GAS AFFAIRS IN BELGIUM.

In the JOURNAL for the 19th ult. we published an extract from a letter received from a Brussels correspondent, dealing with the position of the electric light question in that city. We now supplement it with a few observations by the same writer on gas affairs.

I have told you (writes our correspondent) how matters stand with regard to the electric light in Brussels. Let us see how it fares with gas. Well, it continues to make its way; and very soon it will have become indispensable for all domestic purposes—lighting, cooking, and heating. The customers for this useful commodity have been already acquired, thanks to the excellent measures taken by the gas officials of the Municipality. The number of consumers has increased to such an extent that it has been necessary to considerably extend the manufacturing plant at the Laeken works, which are about to be increased to double their original capacity. Renewals have been effected, and the most improved appliances have replaced the somewhat old-fashioned ones of the first establishment. All these changes have contributed very considerably towards the favourable yield of gas which now characterizes the working. The system of letting on hire both lighting and heating apparatus, which the Municipality practise on a large scale, is attended by the most encouraging results. The credit of this successful innovation belongs to M. Aerts, who continues to carry out the extensive scheme he imposed upon himself when he undertook the general direction of the gas undertaking—in both manufacturing and distributing departments. Let gas be brought down to-morrow to 10c. per cubic metre, as M. Aerts proposed, and there will be an end for a long time to competition from electric lighting, whether supplied by a public body or by private companies.

The movement in favour of gas is very active in Belgium. Nearly all the managers of gas-works follow the example set by Brussels, and offer to let stoves and fittings on hire in order to attract customers. The rate charged per annum is generally one-tenth of the net cost of the appliances. Interior fitting is undertaken on the same terms. Several permanent exhibitions of stoves, &c., have been opened in the provinces, in imitation of the one held at the head-quarters of the Belgian Gas Managers' Association on the Boulevard du Nord, in Brussels. M. Boscheron, at Liége, will shortly open a hall in which there will be displayed an excellent collection of the principal types of lamps, heating-stoves, kitcheners, and roasters. M. Greyson de Schodt, at Namur, has for some time past had such an exhibition; and he advocates, by periodical lectures, which the public follow with much interest, the more general use of gas. He is the author of a small pamphlet on cooking by gas; and he shows therein that he has a keen appreciation of a well-prepared dinner as well as a good knowledge of his business. This little book was distributed some time ago by the Belgian Association. At Antwerp also there is a permanent exhibition of all kinds of gas appliances. In fact, everywhere gas suppliers are increasing their efforts to demonstrate the advantages of the judicious use of gas. All this work is greatly helped on by the makers of these appliances, by the care they bestow on the production of the various types of burners and stoves, and by the more favourable terms upon which they place their goods on the market. Formerly heating and cooking stoves were generally of English production; and from one firm particularly. Now, Belgian manufacturers have come to the front; and several of them compete very successfully with their foreign rivals, both on the score of price and excellence of finish. One firm especially is making great progress in the construction of large cooking-stoves such as that in use in St. John's Hospital, in Brussels, and in the new hospital at Liége. Nestor Martin, the well-known founder,

supplies at a reasonable figure everything connected with stoves and culinary utensils. Other firms devote themselves with more or less success to the production of reflector stoves; and their efforts are specially directed to materially increasing their yield of heat. Consequently, so great is the competition, that the buyer is embarrassed in making a selection from so many articles which are good and cheap.

I have already mentioned the Belgian Association of Gas Managers. The members of this Society hold their general meeting every year on the second Wednesday in June; the business being followed by a banquet. This year the meeting lost its attraction, for not a single paper was presented. There has been some disagreement among the members; and the existence of the permanent gas exhibition itself has been threatened. The way in which things have been managed has given rise to numerous discussions in the Executive Committee. Some members have been accused of wishing to "rule the roost," and to accord too much favour to articles in which they have a personal interest. The Belgian exhibitors found out that they were sacrificed to foreign competitors; and they made formal complaint to the communal administration, who set apart yearly a certain sum to support the exhibition. The result of this was that one English firm had to retire; but another has succeeded it. Discontent has again shown itself; and each party has made out the best possible case. The rivalry existing in the Committee has displayed itself outside; and harmony and good fellowship appear to have ceased to exist among the members generally. This is very much to be regretted; for the exhibition has done great service to the cause it was intended to serve. The visitors are always numerous; and the members of the staff have plenty to do in answering the questions which are every day put to them. It is not long since Madame Alting-Mees attracted a numerous audience by her interesting lectures on cooking by gas; and the weekly lessons which are still given on the same subject are always well attended. Notwithstanding all this, it is in contemplation to close the exhibition; and it is even stated that this will be done at no very distant date.

GAS AFFAIRS AT PROVIDENCE (R.I.).

We have had occasion lately to refer to the position of gas undertakings in the United States; and, in connection with our remarks, the following comments, received from an esteemed correspondent, on the position of gas affairs at Providence, will doubtless be read with nterest:—

One more chapter in the gas war at Providence, Rhode Island, has just been closed; or if it has not theoretically come to an end, it is generally thought to have practically reached its final stage. The difference between theory and practice in this instance is probably of small moment, for, without doubt, the action just taken by the City Council of that city will not be nullified by the Mayor or any other power. However, before giving a *résumé* of the present chapter of the fight, which has kept the management of the Providence Gas Company so thoroughly on the alert during the last few years, it might be well to call to the mind of the readers of the JOURNAL a few points in connection with the gas history of Providence.

The Providence Gas Company had the sole supply of gas in the city in question until the early seventies. At that time the late John Kennedy started an opposition concern, known as the People's Gas Company. The ensuing history was but a repetition of the old story —competition, then consolidation. From that time onward the Providence Company has had the field to itself; but recently, or more correctly during the last three or four years, the monopoly of the Company has been threatened by Mr. Addicks, who has made repeated and persistent efforts to gain admission to the city. He would doubtless have been successful, but for a peculiarity in the state constitution, which requires parties desiring to form corporations such as those engaged in supplying gas to obtain the consent of two successive Legislatures. Had it not been for this requisite, Mr. Addicks would have been successful; but he has not been able to get his charter through two succeeding sessions of the Legislature. During the several attempts made by him in this direction, he has met, as was to have been expected, the most determined opposition of the Providence Gas Company; and the fight at times has waxed most acrimonious, and the hearings on the several measures proposed by him were very warm. As already indicated, the opposition of the Providence Company was successful; and Mr. Addicks was prevented from getting the charter he so much desired. The Providence Company, however, not satisfied with standing on the defensive (not enjoying having a fight every year), recently took the offensive; and they have now succeeded in getting through both branches of the City Government a Bill giving them the monopoly of the gas supply business for a term of twenty years. The Bill, or agreement, which has just passed the Board of Aldermen, having previously been adopted by the lower Board of the City Government, opens as follows: "This agreement, made and executed this day of , 1892, by and between the city of Providence, a Municipal Corporation created by the General Court of the State of Rhode Island, of the first part, and the Providence Gas Company, a corporation created by said General Assembly for the purpose of manufacturing, selling, and distributing illuminating and heating gas, and located and doing business in the city and county of Providence, in said State, of the second, witnesseth." The document then goes on to recite that the party of the first part, in consideration of the agreements of the party of the second part, and acting under chapter 975 of the Public Acts, "does grant unto the said party of the second part the exclusive right for the term of twenty years next succeeding the date hereof, to lay, construct, and maintain, for the purposes for which said party of the second part has been created, pipes or conduits, with necessary and convenient appurtenances, as may be required for the conduct of the business of said party of the second part, in and under the streets and highways of the said city of Providence;" the stipulation being added that the grant is subject to the conditions and restrictions of the public laws. Then, to make this point more binding, there follows a clause by which the Gas Company agree faithfully and strictly to observe all the conditions and restrictions of the Public Acts. Then follows an agreement on the part of the Company that they will pay into the Treasury of the city of Providence a special tax upon the gross earnings of the Company equal to 3 per cent, per annum. Then, after paying to their stockholders at the rate of 8 per cent. yearly upon the capital actually paid in, and after making due and proper allowance for the maintenance and extensions of their plant, they are to apply the balance of their earnings towards the reduction of the price of gas. The quality of the gas furnished by the Company is to be equal to that now supplied. After this follows an agreement on the part of the Company, upon ninety days' notice from the city, to lay pipes in any street that is about to be macadamized or paved, provided the weather permits of such work. The ordinance closes with the stipulation that nothing therein contained shall give the Company the right to dig up the public highways or the streets of city without first obtaining such special permission as would be required to be obtained if the grant had not been made. Unless the lawyers are able to pick some flaw in this ordinance, the future peaceable possession of the gaseous field of the city of Providence is assured to the old Company; and there is general satisfaction at this outcome of the affair.

The Company have administered their affairs ably, have given the public good service at fair rates, and they are justly entitled to the consideration shown to them. Within the last two years they have put in a large water-gas plant, and have thus been enabled to add greatly to the illuminating power of their gas. The Company are thus practically assured of an 8 per cent. dividend—a fair, but not extravagant return; the city will receive a substantial sum each year from the special tax; and the public are reasonably sure of gas at a fair price. So it seems a happy ending of a disagreeable fight.

Excursion of the Employees of the Broadstairs Gas Company.—Through the kindness of the Directors of the Broadstairs Gas Company, the workmen in their service had their annual excursion on the 14th ult., the party being conveyed in a brake to Shepherd's Well. After dinner, a few appropriate toasts were honoured, and the remainder of the time was given up to sports. The return journey was made by a different route; Broadstairs being reached by eleven o'clock, after a long, but most enjoyable day.

Adoption of Inclined Retorts at the Huddersfield Gas-Works.—The Gas Committee of the Huddersfield Corporation, who recently inspected the working of inclined retorts at several gas and chemical works, have now decided to erect under licence to the Automatic Coal-Gas Retort Company, Limited, 20 settings, each of nine 15-feet retorts. The beds will be arranged 10 on each side, and the charging-stage will be between the two benches. The method of charging will be the same as that employed by Mr. Frank Morris at Brentford.

The Water Supply of Guiseley.—At the monthly meeting of the Guiseley Local Board last Wednesday, a discussion took place on the water supply of the township on the receipt of a letter from Mr. J. W. Harrison, the Secretary of the Yeadon Water Company, to the effect that it was intended to open certain streets for the purpose of laying down water-mains and service-pipes. Mr. Walsh contended that the Board should have control of the water supply; and they ought not to allow the Company to begin to supply private individuals in the township. If water was supplied to Guiseley by the Yeadon Company, it ought to be through the Local Board. Mr. Robinson was of a similar opinion; and the Chairman (Mr. Watkinson) and Mr. Bray thought that, before going elsewhere, the Board ought to purchase the works of the Guiseley Water Company. Mr. Robinson replied that he would never be a party to purchasing those works. The Board tried once; and the Company wanted 50 per cent. premium on every share. In the first place, the Guiseley Company had not a sufficient supply; and they had no storeage provision. In the end, the Chairman was instructed to write to the Yeadon Company, asking on what terms they would supply the Board with water in bulk.

The Lucigen Light Company, Limited.—The first meeting of the creditors of this Company was held last Thursday, before Mr. Warley, the Assistant Official Receiver. The total liabilities are returned at £41,010 (£36,267 unsecured); the assets are absorbed by debenture-holders' claims; and the total deficiency to the contributories amounts to £90,347. The Chairman stated that the Company's business had been carried on since the date of the winding-up order (May 28) by the Official Receiver on behalf of the debenture-holders. There was but a comparatively small sum in hand as the result of the trading; and a larger amount would probably be brought into the estate from the same source. So far as the unsecured creditors were concerned, however, there was no prospect at present of any dividend being paid to them, as the debenture and prior lien bonds would absorb anything that might be got out of the assets. A question would arise as to the liability of the holders of vendors' shares, which were issued on condition that debentures were subscribed for. At present he could not express any opinion upon this point; but he would state that it would require some little inquiry; and it might be found that there would be a liability in respect of those shares. On the other hand, the persons who would become liable would be the very people who were apparently entitled to the benefit that would result if the liability had to be met. Mr. F. A. Adeney stated that he was instructed by Mr. Grimston, the inventor of the system under which the Company were partly conducting their business, to attend the meeting, and to say that, under the agreement by which the patent was acquired by the Company, there was a sum of £500 to be paid subsequently. That amount had never been paid; and his client would claim the patents—the Company being bound to re-assign them in default of payment. The Chairman pointed out that it was an open question as to how far Mr. Grimston could enforce his claim, and whether there would be sufficient value in it to justify him in testing the point. The whole circumstances, however, would be subsequently dealt with by the Liquidator. With respect to the business of the meeting—the appointment of a Liquidator—although several proofs had been tendered, they were not in order, and there was no quorum. The meeting, therefore, would have to be formally adjourned for a week, when, unless some special resolution were passed, the estate would remain in the Official Receiver's hands. Some of the shareholders met later in the day; but the proceedings had also to be adjourned for want of a quorum.

THE METROPOLITAN WATER SUPPLY COMMISSION.

Friday, July 22.

(*Lord* BALFOUR OF BURLEIGH, *Chairman; Sir* G. B. BRUCE, *Sir* A. GEIKIE, F.R.S., *Professor* DEWAR, F.R.S., *Mr.* G. H. HILL, M.Inst.C.E., *Mr.* J. MANSERGH, M.Inst.C.E., *and Dr.* W. OGLE, *Commissioners.*)

On the resumption of the proceedings to-day—the fourteenth of the inquiry—further general evidence was given.

Mr. *J. H. Watts*, agent for Mr. Swithinbank, a landed proprietor at Denham, was the first witness; and he created some amusement by his answer to the opening question. The Chairman asked him what he had to say to the Commission, and his reply was: "What do you intend to do?—that is it." From his further examination, it appeared that he objected to a rumoured proposal to take two pipes (of 6 feet) of water from the Colne Valley, which would, he said, run the Colne dry, and the property in the valley would not be worth anything.

In reply to Mr. HILL, witness said they had on the estate wells which were a little below the bed of the river; but they did not touch anything but gravel.

Lord *Curzon* was the next witness. He said he did not hold any official position on the County Council, but he desired to be heard to press upon the Commission the general feeling of the people in South Buckinghamshire that, if there was any large scheme for taking from that part, which was in the watershed of the Thames and the Colne specially, it would considerably damage the water supply of the districts watered by the two rivers.

The CHAIRMAN: What is the scheme which yourself and your neighbours dread—a storeage scheme, or a scheme for deep wells?

Witness said they did not want to see any water taken from that part of Buckinghamshire, because they thought, as far as they were able to judge, that the water supply was only just sufficient now for the needs of the district. This opinion was based principally upon conversation with those who had very carefully investigated the question of water supply in that part of the county, and from knowledge which one might very well have who lived there, that any large scheme of taking water would affect the wells in the neighbourhood.

The CHAIRMAN said these were considerations upon which it would be quite right to put in a general *caveat*, as Lord Curzon was doing, but which would be better dealt with in an investigation after a definite scheme had been propounded.

In reply to Professor DEWAR, witness said the opinion of the inhabitants was not based upon the effects of any works at present in existence, as no schemes had been carried out in that area which would in any way affect them. There was an attempt made a short time ago by the Grand Junction Company to increase their water supply to Paddington from the valley of the Thames near Windsor and Eton; but it was strongly opposed, and was withdrawn. Ever since he could remember, any large scheme of taking water had affected the interests of the inhabitants.

Mr. *W. Gurney*, a farmer at Chalfont St. Giles's, and an Alderman of the Bucks County Council, was the next witness. He stated that he had lived all his life in the Misbourne Valley; and he was of opinion that deep wells with a constant draught would completely drain the whole available supply of water. Asked upon what authority he thought so, he said he was not an expert, but his experience was that of a practical man sinking eight or ten wells on his farms; and he found that if they sank one well deeper than the rest, it drained the others. He knew the whole valley of the Misbourne, and his farms were seven miles up it from the point where it joined the Colne. The farms were two miles apart; but the wells that were drained by a deeper one would be in the immediate vicinity of that one. He had sunk two this year, the old ones becoming dry; and they drained the others that were round about—20, 30, or 50 yards round—for the supply of the neighbouring cottages and houses. He further knew by experience that the water of the Misbourne decreased 50 per cent. in summer as compared with winter.

The CHAIRMAN: It is not an unusual experience, is it?

Witness: Not for me.

Can you also say, from your experience, that there is less water in the Misbourne than when you knew it 20 years ago?—After a heavy rainfall we have a fair quantity of water.

Is there any great artificial draught upon the water, except from wells for the domestic supply?—I think not.

Sir G. B. BRUCE: You say your neighbours would object to water being taken away?

Witness: We are short at times; but we are not at this particular period, having recently had a good rainfall. The bed of the river is chiefly a porous gravel. The wells are sunk into the chalk.

Replying to Mr. HILL, witness added that they had no proper gaugings in the stream of the valley; the millers simply had some rough appliances. He also repeated that there was plenty of water just now; but that there was very little in a dry season—not enough for the use of the millowners or the cattle. But he had not noticed any loss of water other than was accounted for by dry weather. He had only noticed the difference in the flow of the stream in rainy and dry periods—no permanent loss of water.

Examined by Dr. OGLE, witness stated that he was well acquainted also with the source of the Misbourne; and he could not say that there was any difference in the place where it now rose and that of 20 years ago. But he had known the source to be dry more than once in a dry season. In fact, the source varied with the variations in rainfall. Otherwise, there had been no difference during the last 20 years.

Sir A. GEIKIE: Do you notice any diminution in the volume of the stream, looking back to the time when you first knew it?

Witness: No; I think not. It varies according to the rainfall. Just now, it is higher than it was at this time last year.

Re-examined by the CHAIRMAN, witness remarked that he thought the population of the valley was increasing, as a great deal of building was going on.

Mr. *W. Hearn*, steward to Mrs. Gerald Goodlake, of Denham Fishery, in the counties of Buckingham and Middlesex, deposed to a difficulty in keeping up the supply of water in the side streams on which the fishery culture was carried on, and which were fed partly by springs and partly from the River Colne. The Savoy stream, which was mentioned in the statement he had sent in, was a tributary of the Colne, coming out of that river for the purposes of the estate, and then rejoining it. In 1885, or thereabouts, the wells at Harefield were constructed; and the effect of these had been most marked. He believed that they had drawn upon the spring supplying the fishery streams. The well or wells that supplied the Rickmansworth Water-Works had also, he believed, led to a falling off in the water on the estate.

In reply to Sir G. B. BRUCE, witness said he had not observed anything tangible as the effect of the deep well at Rickmansworth upon the wells of the district; but there was a smaller supply of water now than formerly.

Sir G. B. BRUCE: Would that not be attributable to exceptionally dry seasons?

Witness: No; because we find it in all seasons. We are about three miles away from that well; but I think it affects us even at that distance.

Are your streams mainly dependent upon springs?—No; not all. There are a great many tributaries of the river. But it is a very "springy" district.

The effect of the construction of the Harefield wells has been most marked, you say?—In the shortness of the water supply.

Is the evidence sufficiently strong to enable you to trace it to the Harefield wells?—That is what we think.

In reply to Mr. MANSERGH, witness added that the Harefield wells were private—they were not used for any public supply.

In reply to Sir A. GEIKIE, witness mentioned that the distance of the wells from the fishery streams was about a mile; that there were springs in the neighbourhood of the wells, about two miles away; and that in his opinion the flow of the springs was affected by the wells.

Major *Lamorock Flower*, Sanitary Engineer to the Lea Conservancy, was recalled for the purpose of furnishing the Commission with some information asked for by Professor Dewar as to the area of land, together with the volume of sewage treated at the different sewerage works in the Lea Valley. He said there were 17 towns which got rid of their sewage under a certain system of land treatment; in other smaller places the inhabitants disposed of it without any positive system—pouring their slops on to the ground generally. There were some chemical works—such, for instance, as those at Hertford and Welwyn—where sewage was treated by precipitation by the action of chemicals, and afterwards filtered; and there were other places where chemical treatment alone was employed. Wheathampstead had a sewage farm on a small scale, or, as it had sometimes been called, a sewage garden. They pumped the contents of their subsidence-tanks on to the land, and occasionally cleaned out the tanks, and made use of the sludge by digging it into the ground. At Whitwell they had also subsidence-tanks without any chemical treatment; it was a system of sub-irrigation. Where they had a considerable area of land, as at the Royal Small Arms Factory and at Epping, they had no tanks, but a pumping-well; and they did not use chemicals.

By Mr. HILL: Many of the places were very near to the river. There were not times when the water went direct into the river from those places; and great care was taken to prevent it going into the river at all.

Sir G. B. BRUCE: You mentioned two places in particular where a chemical process was adopted instead of land treatment. Have you been able to form any judgment as to the relative advantages of the two systems?

Witness said he thought that the treatment by land was decidedly far superior to treatment by chemicals. Where the chemical process was employed, he had observed contamination reaching the river such as he did not find where the land process was used. His data as to the area of land, &c., were derived partly from his own knowledge at the time the inquiries were held, and partly from recent information, because some of the places had increased. At Bishop's Stortford, for instance, they had added 22 acres, making altogether 120 acres now; and Luton also had entirely changed. Speaking generally, he was satisfied with the working of these schemes. At all the places referred to, they had a fair practical treatment of the sewage question, which was effective in preventing mischief to the river. At Buntingford the sewage farm was close to the river; but the sewage was absorbed in the soil, and there was no effluent from the farm. There were still some houses with cesspools there; and he was trying very much to get the people to have the whole of their houses connected with the sewers. In the case of Hadham, the gravitation scheme was close to the River Ash, and the effluent went into the stream. The effluent was very fair indeed; but the place was only a small one. At Hoddesdon, where there was a population of 2681, they had 17 acres which was pure sewage land—land not used for cultivation. They allowed the sewage to soak away into the ground. At one time it was very bad; but it was much better now. The sewage of only about 900 to 1000 people came down to the 17 acres.

Professor DEWAR called the witness's attention to the details given with reference to Wheathampstead, Whitwell, and Hadham, which respectively used the same area of land—viz., 4 acres. In the first case, there were 2319 inhabitants whose sewage had to be disposed of; in Whitwell, there were 500; and in Hadham, 1398. He asked if witness represented that in all of those cases the treatment was equally satisfactory.

Witness replied that he was perfectly satisfied. The sewage of the whole population was not turned into the tanks. At Wheathampstead the excreta of not more than 1000 persons would come into treatment, and the rest would be disposed of in detail.

Then your table does not enable the Commission to infer what area of land is really used for the disposal of the sewage of a definite number of the population?

I think that may be fairly said. At Sawbridgeworth I was not able to get the area of land. It is a large place; and they were very chary about giving information there at all. At Stanstead Abbotts, 1200 people disposed of their sewage on 12 acres of land; and at Waltham Abbey 6000 persons dispose of their sewage upon an equal area.

Do I understand you to say that the disposal of the sewage in either case is equally satisfactory?—Equally satisfactory.

Questioned by Sir A. GEIKIE, witness said he had observed springs issuing from the chalk between the level of the sewage farm and the stream at Luton; and he had taken samples of the water in the springs and wells extending over three miles of country, and submitted them to analysis, the result of which showed that there was no appreciable injury caused to the springs by saturation of the chalk with the sewage, or by its absorption in the chalk.

Mr. *Child*, Engineer to the Lea Conservancy, was then recalled to produce further tables relating to the flow of water over Fieldes's Weir. In the course of his examination, he said the four driest years were 1874, 1884, 1887, and 1891.

Mr. HILL, referring to the tables, said he noticed that the flow in one day in 1874 was given as 13,320,000 gallons; while in 1887, which was a very dry year, it seemed to have been in excess in all cases, whether for a week, a month, or three months.

Witness said the flow of 1891 was quite as low as that of 1887. The year 1887 was not the driest experienced in the Lea basin. In 1874 the rainfall was 20·15 inches, and almost the same as in 1887; while in 1891 it was 25·95. The flow did not correspond with the rainfall. Sometimes with an excessive rainfall in a thunderstorm or a heavy shower they would get as much as 3 inches in a day; but in dry months this would not affect the flow of the river, as it passed away quickly, and the river did not get the benefit of it. The average rainfall on the Lea since he had known it was about 25 inches a year. The lowest rainfall of which he had any record was in 1884, when it was 18·50 inches. Yet for three months there was a flow of 33,657,000 gallons per day, as compared with 23,326,000 gallons per day, with a rainfall of 25·95 inches.

Mr. *C. E. Groves*, Consulting Chemist to the Thames Conservancy, produced analyses of four samples of water which had been taken on April 21, 1892, which were very much of the same character as those that were examined about the same time last year. They, however, contained rather less free ammonia, and there was less easily oxidizable organic matter, as indicated by the permanganate test. He wished to add, in reference to Dr. Frankland's criticism on the employment of the albuminoid ammonia process, that he preferred this process to the combustion process of Armstrong and Frankland, inasmuch as it differentiated between easily decomposable nitrogenous matter and the total nitrogenous organic matter, a portion of which might not be easily decomposable. He therefore thought, valuable as the combustion process was in giving the total amounts of carbon and nitrogen present, the albuminoid ammonia process was more valuable, if they wished to ascertain whether or not the water was polluted to any extent. That was its comparative value for potable purposes.

Professor DEWAR: So I understand you to say that, although the method of analysis you have adopted is subject to the criticisms made by Dr. Frankland, that as regards organic matter it is not an absolute quantity, there is a good deal to be said for the consideration of a relative quantity, having regard to the character of the organic matter?

Witness: That is so. It distinguishes between the easily decomposable, and that which is not decomposable.

And although the amount is relative to the contamination of the water, it is of importance as an inference?—That is so.

Then do you agree at the same time with Dr. Frankland that the relative value of the oxygen determination is of more importance even than of the albuminoid ammonia?—No.

You prefer the relative?—I prefer the relative albuminoid ammonia, as compared with the relative oxygen.

You are aware, however, that, strange to say, the relative oxygen in the case of the London waters is very nearly exactly in proportion to the relative amount of absolute carbon?—In the Thames water, yes.

But that I suppose you regard as accidental?—No; I do not think it is accidental. With effluents it is not so. In the case of the Maidenhead and Oxford effluents, the oxygen in the Oxford sample was 0·49, and that in the Maidenhead sample 0·35. The albuminoid ammonia in the Oxford sample was 0·05 part per million; in the Maidenhead sample it was 0·19 part.

So that it is inverted?—That is, by the oxygen required, the Maidenhead sample would have appeared to be the better one; whereas with the amount of albuminoid ammonia, it is four times as bad.

So that in that particular case the relative value, as estimated by the oxygen, would have been different from the relative value as estimated by the albuminoid ammonia?—Yes.

But you have not the determination of the total carbon and nitrogen in those respective effluents?—I think not. It is very well known that organic matter which contains no nitrogen is quite easily oxidized by the oxidization process; so that the process would not be in all cases comparable.

Have you at any time, in the course of your position as Analyst to the Thames Conservancy, taken any opportunity of examining into the character of these nitrogenous bodies that are so easily attacked?—No, I think not. The subject is a very difficult one. I have not made any experiments which have led to definite results at all.

But you are satisfied that the condition of the Thames during the period when the last samples were taken was no worse than it was on previous occasions?—Certainly no worse.

The Commission then adjourned till the following day.

South Staffordshire Water Company.—The Directors of this Company recommend a dividend for the half year ending June 30 last on the ordinary stock at the rate of 5½ per cent. per annum, less income-tax, carrying forward a balance of £3543.

Sulphur in London Gas.—Mr. Dibdin's return for the week ending the 23rd ult. shows that the percentage of sulphur in the gas of the South Metropolitan Company, as tested at Blackfriars, Plumstead, and Tooley Street, was again very high. At the first-named place, as much as 30·6 grains per 100 cubic feet was recorded; at Tooley Street, 24·2 grains was the highest; while at Plumstead, the means were 18 and 20·1 grains.

BIRMINGHAM CORPORATION WATER SUPPLY.

The New Water Scheme—Honorarium to the Town Clerk.

At the Meeting of the Birmingham City Council last Tuesday—the MAYOR (Mr. Lawley Parker) in the chair—two interesting matters connected with the new scheme of water supply which has lately been sanctioned by Parliament occupied the attention of the members. The first was a formal resolution referring the newly-obtained Water Act to the Water Committee, with instructions to carry its provisions into effect; and the second was a proposition to suitably recognize the exceptional services rendered by the Town Clerk (Mr. E. Orford Smith) in connection with that measure.

Alderman Sir T. MARTINEAU, in the course of an exhaustive speech, explained the history of the Water Act and the present position of the scheme. The formal resolution submitted was to the effect that the Water Act be referred to the Water Committee, with instructions to carry its provisions into effect, and to report to the Council from time to time; and that the powers conferred on the Council in respect to water supply by the new Act and the Consolidation Act of 1883 be delegated to the Committee. Sir Thomas said he was not there to debate questions which had been already settled by the Council, but to explain how the Committee had proceeded in obtaining the Act of Parliament, and the duties that now remained to be fulfilled in carrying the authorized scheme into operation. The Bill promoted by the Committee had been stiffly opposed, both in the House of Lords and the House of Commons. Altogether, 35 petitions had been lodged against it—by Birmingham opponents; by the County Councils of London, Glamorgan, and Monmouth; by the city of Hereford, authorities and persons relating to fishery rights, railway companies, landowners, highway boards, boards of guardians, and other public and private bodies. The first point the promoters had to prove was the urgency of the need of Birmingham for a fresh water supply. In doing this, it had been shown that the King's Vale well supply was suspicious, if not dangerous, and that it would be impossible much longer to retain the River Blyth as a source of supply; and it would be a matter of grave consideration by the Water Committee as to when they would bring up a recommendation that the river should be abandoned. As to the Birmingham opposition, a good deal might be said; but as it would only tend to irritation, and the revival of controversies now practically settled, it need only be remarked that, strong as the case of the promoters had been, it had been made even stronger by the action of that section of their opponents. In dealing with the London County Council, it had been necessary to demonstrate that, great as the requirements of the Metropolis might be, it had many other sources open; while Birmingham, owing to its high elevation, could find few watersheds, such as that of the Elan and Claerwen, so elevated as to afford a supply by gravitation. Fortunately, the promoters had been able to prove this, to expose the unreasonableness of the suggestion that Birmingham should wait until a Royal Commission had discussed the whole matter, and to make satisfactory arrangements with the city of Hereford. It was an important fact, and one that should have weight with the Council, that not the slightest question had been raised by the County Councils of London, Glamorganshire, or Monmouth, or by the city of Hereford, who were all striving for either an actual or a potential right to the waters of the Elan and Claerwen, as to the quality of the water to be obtained from these rivers, but on the contrary it was admitted that it was of the most admirable character that could be obtained. This came all the more strongly from Hereford, which had been using the water of the Wye, into which these rivers flowed, for very many years. The fishery rights gave a good deal of trouble before the Hybrid Committee in London. But all the matters in difference between the promoters of the Bill and the Board of Trade, the Wye Conservators, and the riparian owners, had been amicably adjusted; and the amount of compensation water, which by the Bill it was proposed to make 22 million gallons a day, and which the fishery representatives proposed should be 40 million gallons, had been fixed at 27 million gallons—22 million gallons being turned in daily, and the remainder stored and loosed in freshets at intervals not exceeding 21 days. Perhaps the most important of all the questions they had had to deal with was that of the land. Of course, it would have been useless to go to the enormous expense which would be necessary to carry out the proposed works if there was any danger of such pollution of the supply as to prevent it reaching Birmingham in its natural purity; and it was therefore absolutely necessary that steps should be taken to prevent not only immediate, but all future chance of pollution. They had to deal with a tract of land in which there was a certain amount of lead to be found; and it was, of course, out of the question to establish works where there was any danger of lead mining going on. To prevent the possibility of this, the only course open was to apply for power of compulsory purchase of the whole of the watershed; and though the Chairman of the Committee (Mr. Campbell-Bannerman) described this proposal—that the Corporation of Birmingham should become the owners of 70 square miles of land in the middle of Wales—as a large order, the members were brought to see that the application was justifiable; and, subject to certain conditions, the power asked for had been granted. The Corporation would, therefore, become the owners of 45,000 acres of land, which had, however, only between 200 and 300 inhabitants; and the largest portion of the land was in very few hands. They proposed at present only to acquire the rights of the two lords of manors—Mr. Lewis Lloyd and Sir J. Bailey, the owner of the Builth Estate—together with all the ancient freeholds and such of the common rights as would be required for the purposes of actual works; allowing the remainder to continue under such regulations as would prevent all possible pollution. Similarly with regard to the existing tenants. It was only proposed to disturb those whose holdings were required for reservoirs or other works; and the remainder would be continued on their farms at present terms, with the additional security of 21-year leases, instead of annual tenancies. Surplus lands it was proposed to restore to those from whom the estates had been purchased on 999-year leases at a rent which would pay 3 per cent. on the cost; and, in deference to the desire of the Commons Preservation

Society, all unenclosed lands would be left open to the public enjoyment. The area they had bought amounted to 4655 acres of ancient freeholds, 23,000 acres of common rights, and 34,634 acres of manorial rights, together with certain easements for the purposes of the aqueduct. The total purchase-money was £286,279; and he believed that the purchases which yet remained to be made would leave a considerable margin under the estimated cost of this part of the scheme. They passed through the House of Commons without any limitation of time for the works to be completed. But in the House of Lords a clause was inserted in the Bill requiring them to be finished in ten years—that was by June 27, 1902; and the clause with regard to the supply of authorities within a 15-mile radius of the works, which was drafted as optional, had now been made compulsory at a fixed charge of 4 per cent. on the capital outlay necessitated for the quantity of water supplied. This would yield a fair profit to the Corporation beyond the amount of interest and sinking fund. With regard to the cost of the parliamentary proceedings, some persons estimated that a Bill of that character could not be passed for less than £50,000; but he was glad to say that it would not be £40,000. They were able to make a fair estimate now of their expenses; and he believed they would be between £30,000 and £40,000 —he hoped well within the latter sum. The Corporation of Manchester had to pay £58,000 for their Thirlmere Bill; but it was fair to say that this charge was made heavier by the fact that they did not get the measure through in a single session of Parliament. The practical result of all this was in the resolution he had to move—that the Water Committee should be authorized to proceed at once with the necessary works. The urgency of this motion would be seen when he stated that the Corporation of Liverpool took from 1880 to 1892 to carry out their Vyrnwy supply; and if the Birmingham works were to occupy as long, it would mean (seeing that the Corporation were limited by their Act to ten years for the completion for the first part of their scheme) that if, at the end of ten years, their works were not finished, they must either abandon them incomplete or go to Parliament again for further powers. This fact, he thought, should have sufficient influence to induce the Council to pass the resolution at once. They should also be influenced by the evidence given before the Committee to show the extreme importance of the new supply being furnished as quickly as possible. In conclusion, he heartily acknowledged the valuable assistance the Corporation had received in the promotion of the scheme. It was the largest ever introduced into England; and the Bill was the most important piece of legislation ever obtained by any municipal body or corporation in the country. The result, he felt, was one which would be satisfactory to the Corporation and the inhabitants at large. The Council should feel that they now had a serious responsibility resting upon them in working for this great end, which would ultimately issue to the advantage of the community they represented.

Mr. S. Lloyd, in accordance with an intimation previously given to the members of the Council, proposed the following amendment: "That, having regard to (1) the unprecedented amount of outlay involved, (2) the proverbial unreliability of estimates for constructive works of this character, (3) the not infrequent instances in which first estimates have in the end been enormously exceeded, and (4) to the fact that, when once the project is entered upon, there can be no drawing back, whatever the cost, it is resolved that the Water Committee be instructed, before proceeding further, to hold a public inquiry in Birmingham before three impartial persons, as to whether it be possible to obtain the additional water required from the underground water resources within a radius of 25 miles of the city; and that the result of such inquiry be laid before the Council in due course—such costs to be allowed to all parties as the assessors may consider reasonable, having regard to the character of the evidence offered." He urged that the underground sources of water referred to in his amendment had been disregarded, and that therefore there was need for the inquiry suggested.

Mr. Jarvis seconded the amendment.

Mr. Jacobs remarked that Mr. Lloyd was backed by 800 ratepayers, who paid more rates than 80,000 persons in any other ward in the city. The Council seemed to overlook the fact that there were running underneath Birmingham rivers of water which was purer than that which they wished to acquire.

The Mayor, in a speech in which he dealt exhaustively with the inquiry before the Parliamentary Committee, expressed himself in favour of the motion.

Sir T. Martineau briefly replied; mentioning that the Council were only committed at present to spending £3,340,000.

The amendment was then put, and lost by 50 votes to 3; the motion being subsequently carried.

The Mayor next moved—"That an honorarium of 1000 guineas be presented to the Town Clerk, in recognition of his eminent services in reference to the Birmingham Water Act, 1892." In doing so, he referred the Council to the history connected with the proposal to increase the Town Clerk's salary in November last, and to the course subsequently decided upon.

Mr. J. Smith seconded the motion.

Mr. Stevens proposed, as an amendment—"That the honorarium to the Town Clerk be deferred for six months, in order that the ratepayers may have an opportunity of expressing their opinion on this and other expenditures of a like character." He said he moved the amendment with great reluctance and regret, because they all knew the uniform courtesy and gentlemanly bearing of the Town Clerk. But was he the only one who had performed extra services in regard to this great undertaking? There was the Engineer, the Secretary of the Water Committee, and he would go down even to the poorly-paid clerks; and all of those who had done extra work should have an honorarium in accordance with their salary and position. He should like to see the whole thing before the Council before they voted upon the matter.

Mr. Barber thought that a sum of 1000 guineas was more than sufficient to meet the case; and he proposed, as a further amendment—"That the sum of 500 guineas be paid to the Town Clerk as an honorarium in recognition of his eminent services in reference to the Water Bill."

Mr. Allen seconded this amendment.

After some discussion, the amendments were submitted; the second receiving 2, and the first 12 supporters only. The original motion was then put and carried by 32 votes to 18.

The Town Clerk, having been called in and informed of the resolution just come to, expressed his gratitude to the Council for having endorsed the recommendation of the Water Committee.

The special report of the Committee dealing with the foregoing matters was then approved; and the Council adjourned.

NEW WATER SCHEMES FOR BELFAST, CARLISLE, AND MANSFIELD.

At a recent Meeting of the Belfast City and District Commissioners, the Chairman (Mr. R. Corry) made an important statement concerning the water supply of the city. Twelve months ago, the Commissioners thought it would be wise to consider how the community stood in regard to the supply, both as to quantity and quality; and they asked their Consulting Engineer (Mr. Macassey) to prepare a report upon the matter. This he did, and he also propounded a scheme for meeting the larger wants of the city in the future. After discussing the report, the Committee thought it would be well to employ some independent engineers to make a survey of the surrounding districts, and to furnish a report as to those best suited as sources of water supply. They accordingly engaged Messrs. Leslie and Reid, the Engineers to the Edinburgh and District Water Trust, and Professor Dewar; and the reports presented by these gentlemen accorded in the main with the conclusions arrived at by Mr. Macassey. They all agreed in recommending a scheme for obtaining water from the Mourne Mountains. The reasons were fully set forth in Mr. Macassey's report why the Mourne scheme had been selected in preference to the Lough Neagh and Glenville. Mr. Reid summed up his investigations in this way: "Comparing the Mourne with the several schemes on a scale of 10,000,000 gallons per day, we find that it will cost £172,000 less than the Lough Neagh scheme if a capitalized yearly expense in pumping is added; but it is £110,000 more than the Glenville scheme for the same quantity of water. Irrespective of the matter of cost, which, no doubt, is a point to be carefully considered in the interests of the ratepayers, the question of the quality of the water is one which must weigh largely with the advisers of the Commissioners in the selection of a source of a future water supply for the great community whom they serve. The analyses by Professor Dewar show that the Antrim waters are all practically of the same character, and are much inferior to the Mourne water. The Mourne scheme can be developed so as to treble the supply to the city, and that at a reasonable cost; and once the Commissioners are in possession of this district, the question of the water supply of the city will be settled for several generations. The cost of the Mourne scheme per million gallons is, no doubt, greater than that from the other sources, but the superior quality of the water, coupled with the fact that the expense of filtration will not be necessary, outweighs, in our opinion, the disadvantages of the greater first cost." Mr. M'Cammond observed that it would be in the recollection of the Board that in 1884 the Bill authorizing the Stonyford scheme was promoted; and at that time they considered they were providing works which would be sufficient for the city for fifteen years. The consumption of water at that time was 6,500,000 gallons daily. Within the years that had since elapsed, the daily consumption had, however, risen from 6,500,000 to 9,500,000 gallons—almost 50 per cent. This, of course, was owing to the great development of the city; and should it continue to progress at anything like the same rate, he was quite satisfied there would be no additional taxation necessary for this new scheme. Mr. M'Connell remarked that he understood the initial cost of bringing in this supply would be nearly £500,000. But this would not be required at more than £100,000 a year for the next five years; and they hoped the natural increase of revenue from rates would be sufficient to cover the interest and sinking fund on the loan without additional taxation. No other member took part in the discussion.

The minutes presented by the Water Committee to the Carlisle Town Council at their last meeting contained a resolution, recommending the adoption of the report of the Committee on the question of obtaining a supply of water by gravitation, a notice of which appeared in the Journal for the 28th of June. The concluding sentence of the report was as follows: "(1) That the time has come when it is necessary to take steps to extend and improve the water supply of the city; (2) that such extensions and improvements would be most satisfactorily met by a gravitation scheme; and (3) that it be recommended to the Council to authorize this Committee to call in a consulting engineer to advise and report hereon." Mr. Forster moved the adoption of the report, and remarked that all the Committee now asked for was power to call in an engineer to take a survey of the various watersheds around Carlisle. They were very much in favour of the Caldew, but that was a matter to take into consideration after they had consulted an engineer. In seconding the motion, the Mayor (Mr. B. Scott) called attention to the statement, in the report of their Engineer (Mr. J. Hepworth) that the revenue from the waterworks had increased from £2800 in 1886 to £7170 in 1891; and he thought this simple fact, without going into a great amount of detail, showed very clearly that the Committee were wise in looking ahead. It would be many years before a gravitation scheme could be carried out, and before they could bring water from the side of Skiddaw to Carlisle; and it was all the more important that they should lose no time in making up their minds. Mr. Coulthard spoke strongly in favour of the gravitation project; while Mr. Phillips thought sufficient reasons had not been adduced by those who advocated a new scheme for involving the town in such a large outlay of money. Other members having supported the motion, Mr. Etchells moved an amendment that the second conclusion arrived at by the Committee should be expunged, and then no gravitation scheme would be implied. This having been seconded, Mr. Hepworth was called upon to address the Council. He said it was perfectly unsafe to rely upon the existing engines to do more work than at present; and the immediate

necessity for any action at all arose from the fact that they required a larger storeage and higher pressure. They could not get the increased storeage without constructing a new reservoir, and they could not obtain a higher pressure without a new engine; and these would cost together between £30,000 and £40,000. In addition to the cost of the new engine, they would have the renewal of the old ones occurring within a few years. It was true that only one engine was working at a time; but there had been occasions when it was necessary to use them both, and that was the case now every winter when there was an excessive frost. With respect to the quality of the water, he did not think any town in the country was better supplied with river water than Carlisle. The amendment was rejected, and the recommendation of the Committee was then adopted.

At the meeting of the Mansfield Town Council on the 15th ult., a voluminous report on the proposed water scheme, prepared by Mr. T. Hawksley, was read by the Mayor (Mr. G. H. Hibbert). Mr. Hawksley, it will be remembered, was appointed to investigate the water question consequent upon a report issued by Mr. Dalton, who acted at the instigation of the Mansfield Ratepayers' Association; and on his visiting the town, seeing that considerable difference existed with respect to the schemes of Mr. Hodson, the Borough Engineer, and Mr. Dalton, he invited the Mayor and gentlemen advocating each side to accompany him in his inspection, which was done. In his report, he said he was clearly of opinion that the existing waterworks ought to be abandoned, or at best retained only for "stand by" purposes, as they yielded only 24,000 gallons of water per day, and water of a quality very inferior to that which might be obtained in another available situation. In operation, too, they were very costly. He, however, excepted the service reservoir and the main pipes, as they would be valuable for other purposes. In his judgment, any new source should be capable of furnishing at least 700,000 gallons per day. The Engineer (Mr. Hodson), after much research, had selected an eligible site near the Rainworth Brook, on which he proposed to sink a well or shaft in the Bunter beds of the trias formation, and at a depth of 100 feet, by means of the well and its accompanying bore hole and drifts, to obtain the stated quantity of water, and by engine power to force it to a high-service reservoir to be constructed on Berry Hill. He agreed with Mr. Hodson in thinking that Rainworth was the best situation in which works for the objects in view could be established. He differed from Mr. Hodson as to the size of the engines, believing that smaller engines and less supply-pipes would be of sufficient size to convey the water to the reservoir; and, in his practice, he had found it cheaper to pump longer hours, and thus diminish the capital to be expended on plant. The reservoir at Berry Hill ought to hold at least 800,000 gallons as originally proposed, unless the existing reservoir was connected with it, in which case it might be reduced to 500,000 gallons as suggested by Mr. Hodson. With regard to Mr. Hodson's estimate of £25,000 for the works, he was of opinion that it would be found to be sufficient; and he strongly recommended its acceptance. The suggested reduction of the capabilities of the undertaking by limiting the outlay to £20,000 would involve a serious detriment to the interests of the community. As to the quality of the proposed source, he was able to express a confident opinion that it was well adapted to dietetic and manufacturing purposes, and that there was no reason to apprehend that it would attack lead or other metal. He founded these opinions on the result of Dr. Tidy's analysis, which to his mind was very satisfactory. At the conclusion of the reading of the report, Alderman Barringer moved that application be at once made to the Local Government Board for sanction to borrow £25,000 for carrying out the scheme; but it was decided to adjourn the consideration of the question. A special meeting of the Council was subsequently held, at which it was decided to ask Mr. Hodson to amend his scheme in accordance with Mr. Hawksley's suggestions. When this has been done, and the plans have been approved, the Local Government Board will be asked to sanction a loan of such an amount as they may consider sufficient for carrying out the works.

Taunton Gas Company.—In the report presented at the annual general meeting of this Company last Tuesday, the Directors stated that the quantity of gas sent out in the twelve months ending June 30 last was 59,658,900 cubic feet. The net receipts for gas supplied to private consumers amounted to £10,334; a sum of £441 being received for the public lighting. The Directors recommended dividends of 8 per cent. on the "A" stock, and 7 per cent. on the new capital.

Sales of Shares.—At the Auction Mart, Tokenhouse Yard, last Wednesday, Messrs. Edwin Fox and Bousfield sold by auction, in one lot, a complete adventurer's share in the *New River Company*. There were a large number of people present; but the bidding was confined to two or three persons. The first offer was £80,000; and this at length was increased to £106,000, at which figure the share was finally knocked down. Having disposed of this, the auctioneers offered a fourth part of an adventurer's share and parts of a King's share in the same Company. The former was divided into lots each consisting of a 20th part of a complete share; and of these three sold for £4500 each; 1, at £4490; and 1, at £4400. As regards the King's share, the first lot offered, consisting of a 100th part of a whole share, realized £860; and of the following 13 lots, each lot being a 120th part of an entire share, 9 sold at £740 each, and 4, at £700 each.—— Messrs. Finn and Son recently sold at Faversham several lots of shares in the *Faversham Gas and Water Companies*. Three lots, each consisting of £100 original stock in the Gas Company, fetched £146 each; and one lot, £147. A parcel of £80 of similar stock sold for £120. Nine £10 fully-paid preference shares in the Water Company sold at £23 per share; and 33 £10 ordinary shares sold, in lots of five, for £22 5s. and £22 10s. each.——On Monday last week, Mr. Alfred Richards sold at the Mart, Tokenhouse Yard, the following stocks and shares: £300 of 6 per cent preference stock of the *Enfield Gas Company*, £366; 14 fully-paid shares of £20 each in the *Brighton and Hove General Gas Company*, £616; 6 fully-paid shares of £10 each in the *West Kent Gas Company*, £109; 400 shares of £5 each in the *Romford Gas Company, Limited*, £2628; 6 shares of £5 each (£4 paid) in the *Harwich Gas Company*, £30; and 153 shares of £5 each (paid up) in the *West Ham Gas Company*, £1530.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

This year's meeting of the North British Association of Gas Managers had more than ordinary interest, from the fact of this being the centenary year of gas lighting. I went to Stirling fully prepared for a deluge of oratory upon centenary matters, and chiefly upon the progress of the gas industry. True, I knew that the Committee had made no preparation for bringing it forward, at which I almost wondered, because the subject was one which would have stood a paper of the first-class order. I thought, however, the President would introduce the subject; but he said little upon it, and the flood-gates were not opened. Perhaps the President was right not to introduce it informally; but I think the Committee might have taken cognizance of such an important subject in an authoritative way. I will go the length of saying for the Committee, however, that they probably expected that the ceremony on Friday would be sufficient. If they did so, they must have been grievously disappointed; for Lord Kelvin made a very poor show indeed in his oration. He only brought out Murdoch as he is portrayed in the book which was published about him last spring—in fact, three-fourths of his remarks consisted of reading quotations from that book. Murdoch's work received no attention. Presumably, his lordship thinks his work was for the century it has benefited; that its day, in the character in which it has been known, is about done; and that therefore he should not waste time over an old-world subject. Of the meeting itself, a report will be appearing in other columns of the JOURNAL; and it will be sufficient to say here that it was most capably led by Mr. MacPherson, and that the work it got through was satisfactory both in amount and quality. There is just, if I may be pardoned for saying so, a trifle too much of the vote of thanks about the meetings. For instance, all the authors were thanked at the close of the discussion upon their individual papers, and again more formally at the close of the meeting. There is no need for thanking a man twice; and the proper time was at the end of the meeting. It is difficult to alter a practice, and particularly a bad practice; but it is to be hoped that a President will be found who will be strong enough to cut down some of the verbiage which somewhat cumbers the meetings of the Association. It is a circumstance which I cannot account for, but I have noticed at this and other meetings, that gas managers, as a body, are remarkably good speakers. Town councillors require all their time to hold their own with them. It is said that the gardener is the most intelligent of all tradesmen; and I think that in their sphere gas managers must be admitted to a similar position. The members who attended at Stirling were a happy crew; and between their formal gatherings there was much good fellowship, arising from the feeling of clanship, which is strongly marked. There is a good feature in the Association, in that most of the members bring their lady friends with them for the festivities of the second day, by which the happiness and pleasure of the gathering are greatly enhanced. It is satisfactory to see that the Association continues to hold its ground, both in numbers and in ability; and I am sure everyone will join in the hope that its history in the future may be on the same lines. There can be no doubt that such a gathering as the one at Stirling must be productive of much good.

The accounts of the Glasgow Gas Trust for the past year have been made up; and they show a deficit of about £26,000. This is the first time, within my knowledge, in which a deficit has been experienced in the Gas Department of Glasgow. A year ago they were able to report a surplus of £1150, and carried forward £694; so that whatever loss there is, has all been the result of the past year's working. The year was started with no very bright hopes; but probably such a large deficit was not expected. It is satisfactory to know, however, that the amount of gas consumed is still on the increase. The deficit of this year is but a mere flea-bite, considering that the revenue of the Trust is probably more than half a million. To wipe out the deficit, it is proposed by the Finance Committee to advance the price of gas from 2s. 6d. to 2s. 9d. per 1000 cubic feet. Even at 2s. 9d., Glasgow would still stand in the position of having the lowest priced gas in Scotland. The added 3d. would, it is estimated, produce £40,000 more than has been earned last year. There are rumours that, when the accounts come up for consideration, the proposal will be made (as an amendment to the Committee's recommendation), that the advance be only 2d. That, it will be observed, would produce a little over £26,000 more than last year, which would be very close financing—a step which the Town Council is not likely to take, in view of the large capital expenditure which the Gas Trust is under the necessity of facing in the extension of the storeage accommodation. The new gas tank at the Temple works—formerly the Partick, Hillhead, and Maryhill Gas Company's works—the construction of which was placed with Mr. Robert M'Alpine, of Glasgow, has been completed; and it is to be viewed on Tuesday next by an invited company, who will afterwards be entertained to luncheon.

Mr. Samuel Stewart, of Greenock, who was called in by the Aberdeen Corporation to report upon the proposed extension of the gasworks, has reported that, on account of the increased demand for gas, an extension of the retort-power and storeage accommodation is absolutely necessary, and should be gone on with immediately. In view of the rapid growth of the city, the extension proposed by Mr. A. Smith, the Engineer, is such as he would suggest. He is satisfied that an electric light installation would not materially affect the demand for gas. He approves of the proposal not to proceed with the whole of the extensions at once, but from time to time, as the circumstances require. By this method, the work could be done more economically, and the latest improvements could be introduced as the extensions went on. He considers Mr. Smith's estimate of £80,000 is about right; but he would add £6000 for safety, to meet any increase in the price of material, and £4000 for contingencies. The report has not yet been considered by the Gas Committee.

The Edinburgh and Leith Gas Commissioners on Monday held what is in reality their annual meeting—the meeting at which the annual accounts come up for approval. I am sorry to have again to write depreciatively of the Commissioners; but I cannot do otherwise. Their meeting on Monday simply drifted. I am afraid that the same remark, if applied to their method of conducting business generally,

would be but too true. Their first item of business was the output of gas during the month of June, which came up in its natural place in the minutes of the Works Committee. The Engineers' reports showed an output from the Edinburgh works of 34,533,000 cubic feet—a decrease of 2,257,000 cubic feet as compared with June of last year; and from the Leith works, of 13,151,000 cubic feet—a decrease of 206,000 cubic feet. There was thus a total decrease of 2,351,000 cubic feet. Mr. Kinloch Anderson, the Convener of the Committee, said that the consumption of gas was decreasing at an alarming rate, which, he thought, pointed to the necessity for a decrease in the price. This was by no means an exhaustive, or even satisfactory, treatment of the subject, as he did not say a word as to any causes for the decrease besides the high price. The price is the principal reason; but there are others—a very important one being the higher illuminating power of the gas which is now supplied. The Commissioners then took up the subject of the applications by employees for increase of salary, when an extraordinary state of matters was revealed. At the previous month's meeting, the applications, which then numbered six, were sent to a Committee to consider; but when the Committee met for that purpose, they found that the applications then numbered 57. As they had no power to deal with the 51 new applications, the Committee came back to the Commissioners for further powers. Mr. Gibb, the Treasurer, stated that he had been spoken to by some of the employees from time to time, with reference to increase of salary; and he had always discouraged applications because he understood that the Commission was working upon the principle which was followed by the Gas Companies—viz., that the salaries of the employees would be considered by the employers at intervals of from four to five years, and adjusted either by increase or decrease. He had himself, he said, never applied for an increase, and a number of the best employees had also not applied; but he should consider he was unjustly treated if his services did not receive recognition. That disposes of the letters to the newspapers to which I referred in the JOURNAL of the 12th ult. The statements in those letters were manifestly incorrect. The Lord Provost made the sensible remark that all such applications should come through the heads of departments, and that employees writing to the directors was a thing unknown. Following upon that sound exposition of the correct practice, it was the duty of the Commission, without more ado, to have dismissed the whole of the applications, with the intimation that they would only consider such matters if they came through the heads of departments, and after they had been considered and reported on by Mr. Gibb. It will be impossible to maintain discipline in the staff if the Commissioners take to the practice of dealing directly with their employees. If the Commissioners are not aware what their duty is, they will be none the worse for being told that they ought not, in a sense, to know one man from another on the staff, and that all communications, of whatever sort, between them and the staff, ought to pass through the hands of the Treasurer, who is their principal official. What they did was to remit the whole subject of remuneration to the Committee to consider and report—that is to say, the Commissioners adopted the policy which the Treasurer said they should, but with the difference that they have taken action at the instigation of their staff, and they have established the false principle that the tail may wag the head, instead of showing the tail that it is the head which directs the policy of the Commission. Their next business was also a most extraordinary exhibition. Mr. Pollard rose to move the motion with reference to the disposal of the surplus on last year's working, which he had given notice of at the Finance Committee, and which was contained in my "Notes" of last week. It then transpired that the surplus had not been declared, in respect that the accounts had not been approved. He had consequently to direct his attention to the approval of the accounts; but immediately the difficulty arose that the accounts had never been submitted to the Commissioners. They had been laid before the Finance Committee, and copies had been sent to the local newspapers, who gave their version of them to the public; but the Commissioners had never been informed that the accounts were before them, and some had only received their copies on the previous Friday. Mr. Pollard's task was one for which he had evidently come unprepared; and he consequently talked mere twaddle in the few sentences he spoke. The only apposite remark he made was that he thought the accounts were satisfactory. Why they were satisfactory, he did not say; and the public are yet, except for the newspapers, unaware of how their gas business was worked last year. The result is that there is speculation in the newspaper columns as to some of the statements which were made, all which might have been avoided if the Commissioners had made it plain in what position they stood. The accounts having been approved, Mr. Pollard addressed himself to the subject of the disposal of the surplus; and then he gave the speech which he had evidently prepared. There was not much in it, except the statement that the average price of coal—which they estimated at 20s. 8d. per ton—had, in the working, come out at only 18s. 3d. per ton. How that had happened, he did not say; but it has since been stated in a newspaper that, owing to the mildness of the past winter, they were able to use less of the higher-priced coal. Mr. Kinloch Anderson moved the motion he had given notice of, but it was lost; Mr. Pollard's being adopted by six votes to four. The Commissioners have accordingly resolved to contribute double the statutory amount to the sinking fund, with a view to their purchasing annuities from time to time. It was a curious circumstance, but quite characteristic of the Commissioners, that neither of the speeches in the discussion made the matter in the least degree clear, and that the true state of affairs—that they had extracted from the pockets of consumers during the year £25,000 more than they were entitled to—was only brought out by the Lord Provost's questions. I say nothing as to the merits of the questions they discussed; I simply point out that in the matter of procedure they are woefully backward, and that the effect of this is that they are rapidly losing the confidence of the public. Their business capacity is doubted by many; by a smaller number their honesty is doubted—the latter feeling being based on the ground that where something is concealed there must be some reason for it. What the Commissioners want is a leader, someone who will be able to place their business intelligently before the public, and who, at the Board meetings, will be able to keep his brother Commissioners in order and prevent them wandering aimlessly down the agenda paper—speaking often at the wrong time, sometimes saying wrong things, and generally showing they do not understand much they are talking about.

The Edinburgh and District Water Trust on Thursday had before them their accounts for the past year. Bailie Archibald, of Leith, moved their approval; and in explanation of them, he said that their expenditure had been below the estimate of the Treasurer by a small amount—viz., £70, but there had been paid out of revenue the extra expenditure in connection with the additional supply inquiries, amounting to £1844, which was not included in the estimates. Even with this extra expenditure, there was a decrease in the total expenditure of £343. The revenue had slightly exceeded the estimate; but as the Trustees felt justified in reducing the domestic rate last year from 6d. to 5½d. per pound, which entailed a loss of revenue of at least £2750, the total revenue was under that of 1890-91 by £1724. Notwithstanding the reduction of the rates and the extra expenditure, it was very satisfactory to find that there remained a surplus in favour of revenue to the amount of £1185. The Trustees recently reduced the special rates and charges to builders, as from May 16 last; and that would involve a loss of revenue for this year of £700 or £800. The total revenue for the year was £82,321; and of this sum, special rates and charges upon builders accounted for £36,120. The accounts were approved.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 30.

Sulphate of Ammonia.—There is no change in position or prices; and the unwillingness to entertain business to any extent is accentuated by the prevailing holiday mood. The determined attempts made to create a weaker feeling seem to foreshadow coming requirements. There is otherwise too little stock, and too little produced, to weigh down the market naturally. Better things may happen in August. Meanwhile, the month closes with a dull feeling; and sulphate is offered at £9 17s. 6d., without much passing.

LONDON, *July* 30.

Tar Products.—Business is decidedly dull; and, with the exception of a slight improvement in carbolic acid, it is exceptionally uninteresting. Benzols "hang;" and although very little is being produced, the values do not improve. Pitch is moving off slowly; but buyers are expecting to contract for next season at lower rates. The other tar products are languid and prices tend lower. These are: Tar, 8s. to 10s. 6d. Pitch, 27s. Benzols, 90's, 1s. 8d.; 50's, 1s. 3½d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2d. Crude benzol naphtha, 30 per cent., 7d. Creosote, 1d. Naphthalene, 25s.; pressed, 45s. Carbolic acid, crude 60's, 1s. 7d.; 70's, 1s. 10d.; crystals, 7d. Cresol, 1s. 9d. Anthracene, 30 per cent., "A" quality, 9d.; "B" quality, 6½d.

Sulphate of Ammonia.—Stocks are low, and make is small. Enquiries are few; and the market may be said to be distinctly slack. Sales are reported at prices ranging from £9 15s. to £10, less 3½ per cent., according to position and conditions. Gas liquor (10-oz.) is quoted at 5s. 6d. to 6s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The gas-coal season may now be regarded as almost drawing to a close; and there are very few contracts of any importance that remain to be settled. Here and there, one or two fairly large contracts are still pending; but these will scarcely make any difference with regard to the general run of prices, which seem to have been established upon the business for the past season. As regards the bulk of the contracts that have been placed, the concessions have not exceeded 3d. to 6d. per ton. In isolated cases, where sellers of gas coal have been anxious to get in, specially favourable terms have been offered, and one feature has been the low figures at which tenders for unscreened gas coal have been sent in; but taking into consideration the large quantity of slack which must necessarily be included with this class of fuel, a very considerable margin in price would be required to cover the difference in value, as compared with well-screened coal. For the best qualities of screened Wigan Arley gas coal, prices may be said to have ranged from 9s. 6d. to 10s. per ton at the pit mouth, with inferior descriptions varying so considerably, according to quality, that quotations cover too wide a range to be of any really definite value. With regard to the general round coal trade, business continues extremely quiet; but prices generally are well maintained, and it is very exceptional where forward contracts can be placed at anything appreciably under last year's prices. At the pit mouth, best Wigan Arley is still quoted at 12s. to 12s. 6d.; Pemberton four-feet and second qualities of Arley, 10s. to 10s. 6d.; and common house-fire coals, 8s. 6d. to 9s. per ton—the minimum quotations representing practically the actual selling prices upon sales for present delivery. The lower qualities of round coal continue the chief drug in the market. For inland sales, steam and forge coals do not average more than about 7s. 3d. to 7s. 6d. per ton at the pit mouth; whilst for shipment, it is very exceptional where more than 8s. 9d. is being got for steam coal delivered at the ports on the Mersey. The best North Wales steam coal is offered, delivered in waggons at Birkenhead, at as low as 9s. 6d. per ton. Engine fuel continues in brisk demand, ordinary descriptions of burgy readily fetching 6s. 3d. to 6s. 9d.; best qualities of slack, 5s. to 5s. 6d.; medium sorts, 4s. 3d. to 4s. 9d.; and common, 3s. 6d. to 4s. per ton.

Northern Coal Trade.—There is considerable activity in the coal trade of the North of England. Prices are maintained; and for prompt supplies of best Durham gas coals there are rather higher rates asked. Northumbrian steam coals are steady, at about 10s. 6d. per ton f.o.b.; and most of the collieries have rather long turns. Second-class coals are a trifle easier, at about 9s. 6d. per ton. There is a very full supply of small steam coals; and the price is now about 4s. to 4s. 3d., according to quality and position of the pits.

Bunker coals are dull. For gas coals, the demand is rising very satisfactorily, the consumption increasing now almost weekly. Many of the collieries have to make up the quantities they got behind with their contracts during the long strike; and this and the growing demand seem to have stiffened the price. For a prompt supply of best Durham gas coal, it is said that the "fancy" price of 10s. per ton f.o.b. has been paid; but the general price may be given as 9s. to 9s. 6d., and certainly good qualities of Durham gas coals may be had at 8s. 6d. per ton. Manufacturing coals are also very quiet, the supply being rather abundant. Blast furnace coke is now being produced more freely; but the price varies very greatly—from 14s. 9d. up to 17s. per ton. The local consumption of coke is increasing. There is now rather more gas coke in the market; but the price has not varied of late.

Scotch Coal Trade.—The miners are supposed to have returned to work last week, but large numbers of them have not yet gone down the pits. Supplies have, however, been equal to the demand. It looks as if the autumn demand from Baltic ports is to be exceedingly small this year. Ell coal is most in request. Splint is sluggish; and, along with main, is easier in price. Some coal masters are grumbling at the high rate of wages paid to the miners; but as yet there is no movement towards a reduction. The prices quoted are: Main, 7s. 3d. to 7s. 6d.; ell, 8s. 3d. to 8s. 6d.; splint, 7s. 9d. to 8s.; and steam, 10s. to 10s. 3d. per ton. The shipments from Scotch ports during the past week were much lower than usual, owing to the holidays. The total quantity was 109,259 tons, as compared with 160,989 tons in the preceding six days—a decrease of 51,730 tons, and a decrease as compared with the corresponding week of last year of 6597 tons. For the year, the total shipments have been 4,075,376 tons—an increase of 567,662 tons over the same period of last year.

Electric Lighting at Larne.—Last Tuesday evening the town of Larne was for the first time illuminated by the permanent electric lighting plant which has been put down by Messrs. J. E. H. Gordon and Co., of London. The streets are at present lighted by 11 arc and 50 incandescent lamps; and a few additional ones are in course of erection.

South Hants Water-Works Company.—In the half-yearly report of the Directors of this Company, satisfactory progress is recorded. During the past six months, the rental has increased by £264, and 139 additional houses have been supplied with water. The net profit for the half year is £2526. The Directors have entered into a contract with Messrs. Cochrane and Co., of Middlesbrough, for supplying pipes to lay a new 12-inch main from Romsey, direct to Eastleigh, to provide for the increasing wants of the inhabitants of this rapidly growing district.

Exhibitions of Gas Appliances.—As our readers may have noticed by the advertisement which appeared last week, Messrs. Richmond and Co., Limited, of Warrington and London, have a very fine display of "Model" cookers and gas-ranges at the Isle of Man International Exhibition, at the Belle Vue, Douglas; and Messrs. J. Wright and Co., Limited, of Birmingham and London, make a good show of their "Eureka" stoves, in conjunction with a capital assortment of grillers and boilers. The first-named firm were the chief exhibitors at a gas exhibition recently held at Belper, under the auspices of the Gas Company. This was the second display of gas appliances in the town; and it was more successful than the previous one, at which the system of letting on hire was initiated. Successful exhibitions of gas appliances have lately been held at Wolverhampton and St. Albans by Messrs. W. Parkinson and Co.; practical lessons in cookery being delivered on each occasion by Miss Thwaites, of the Liverpool International School of Cookery.

Cambridge Gas Company.—The half-yearly meeting of this Company was held last Thursday; and the Chairman (Mr. C. Balls) had a very satisfactory report to submit to the shareholders. He said that they were led by their Manager (Mr. W. Duesbury) to expect that the half year would be a very favourable one; and their expectations had been realized. The gas-rental at Midsummer, 1891, amounted to £16,272; while on the present occasion it was £17,190. Having mentioned that they had been able to make easier contracts for the purchase of coal, he referred to the electric light, and said that, although some of the tradesmen and the colleges would avail themselves of it, he did not think the shareholders would be much damaged; and he thought he could see his way to their being paid the maximum dividends. It would be remembered that some efforts were made to persuade the public to adopt gas-cooking stoves; and he was very glad to say they had now upwards of 100 at work. Speaking for himself, he had not burnt an ounce of coal for months; and he could appreciate the advantage it was to the house, and the labour it saved the servants. The Chairman then proceeded to say that their Consulting Engineer (Mr. Hawksley) had advised them to make provision for an extension of the works; and had pointed out that last year their Manager was in the greatest danger. Of course, the Directors had looked at the matter in a very serious way. The outlay would be from £18,000 to £20,000; and they would not have been persuaded to consent to this expenditure, had they not been convinced that it was their duty to incur it. The new works would consist first of a new meter-house, a double-span roofed coal-shed, and, most important of all, a gasholder, which would store 520,000 cubic feet. The largest holder they had at the present time would only contain 310,000 feet. The Directors had power to raise the capital; and they could borrow money at 4 per cent. If they had ordinary success, and nothing specially adverse to the interest of the Company arose, then at the end of the next six months he hoped he would be able to congratulate the shareholders on the success of the new undertaking. Mr. Collier seconded the motion, which was agreed to. Dividends at the rate of 10 and 7 per cent. on the various classes of stock and shares were then declared; and after the usual formal business had been transacted, a vote of thanks was passed to the Directors, in acknowledging which the Chairman spoke in the highest terms of the services rendered to the Company by Mr. Duesbury.

Laying Gas-Pipes on Wimbledon Common.—At the Wandsworth Police Court last Friday, the Wandsworth and Putney Gas Company were summoned by Mr. Jesse Reeves, on behalf of the Wimbledon and Putney Commons Conservators, for digging two trenches and laying gas-pipes across a portion of Wimbledon Common, in contravention of the bye-laws. Mr. Birkett, who supported the summons, said the Conservators felt justified in taking these proceedings, because the Company asserted their right to open the ground. Mr. Denman remarked that the Company had a right to lay gas-pipes. Mr. Besley, on behalf of the defendants, said their Private Act gave them the power to break up any street within the limits of the district, and the definition of the word "street" as given by the Act was "any open space or public highway." All private interests in the common were destroyed by the payment of an annuity to Earl Spencer. Mr. Denman pointed out that the Conservators could take proceedings in a Civil Court. Mr. Birkett argued that the common could not be considered a public place within the meaning of the Act, as streets only were mentioned. Mr. Denman said Mr. Birkett was not going to contend that England's commons were not public places. He dismissed the summons, saying that it was a question for the Civil Courts.

The Bradford Water Supply and Lead-Poisoning.—Last Friday a large number of representatives of the local authorities in the out-districts supplied with water from the Bradford high-level service on the invitation of the Corporation Water Committee, paid a visit of inspection to the Thornton Moor Water-Works, with special reference to the precautions taken to prevent lead-poisoning. Owing to the complaints which have been made regarding the plumbo-solvent action of the Thornton Moor water, measures have been taken lately to harden it by the addition of lime. At first the lime was added to the culvert from the reservoir by hand. But this rough-and-ready method of correcting the acidity and softness of the water was found to be lacking in efficiency; and an apparatus was devised by the Water Engineer (Mr. Watson) by which the necessary amount of lime is delivered at regular intervals, and thoroughly incorporated with the out-flowing stream. Since then the action of the high-level service water on lead has been materially modified, and so far reduced that, with ordinary precautions, not the slightest danger can arise.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 196.)

Issue.	Share	When ex-Dividend.	Dividend & Div. Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	13 Apr.	10½	Alliance & Dublin 10 p. c.	10	16—17	−½	6 3 6
100,000	10	,,	7½	Do. 7 p. c.	10	11—12	..	6 5 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	103—105	..	4 15 3
100,000	20	27 May	8	Bahia, Limited	20	10—12	..	13 6 8
200,000	5	12 May	7½	Bombay, Limited	5	6—6½	..	5 15 9
40,000	5	,,	7½	Do. New	4	4¼—4½	..	6 6 4
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	215—220	+3	5 11
150,000	,,	,,	9½	Do. New	100	165—170	..	5 8 9
220,000	20	11 Mar.	11½	Brighton & Hove Original	20	41—43	..	5 6 11
888,500	Stck.	11 Mar.	5	Bristol.	100	95—100	..	5 0 0
320,000	20	13 Apr.	11½	British.	20	41—43	..	5 4 8
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	10	19—20	..	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	15—16	..	5 6 3
328,750	10	—	—	Buenos Ayres (New) Limited	10	6½—7½	..	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	92—95	..	6 6 4
150,000	20	26 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	13 Apr.	13	Commercial, Old Stock	100	231—236	..	5 10 2
165,000	,,	,,	10	Do. New do.	100	180—185	..	5 8 1
130,000	,,	15 June	4½	Do. 4½ p. c. Deb. do.	100	120—125	..	3 12 0
800,000	Stck.	15 June	13	Continental Union, Limited	100	218—223	..	5 16 7
200,000	,,	,,	10	Do. 7 p. c. Pref	100	185—195	..	5 2 7
75,000	Stck.	30 Mar.	10	Crystal Palace District	100	185—190	..	5 5 3
486,090	10	28 July	10	European, Limited	10	19—20*	..	5 0 0
354,060	10	,,	10	Do. Partly paid	7½	14—15*	+½	5 0 0
5,470,820	Stck.	12 Feb.	12	Gaslight & Coke, A, Ordinary	100	220—225	+1	5 6 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	94—98	..	4 1 7
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	253—256	+3	3 17 4
30,000	,,		5	Do. F, 5 p. c. Prf.	100	118—123	..	4 1 3
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	169—174	..	4 6 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	157—162	..	4 6 5
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	252—257	+2	3 17 8
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	148—153	..	3 18 5
1,061,150	,,	15 June	4	Do. 4 p. c. Deb. Stk.	100	114—116	..	3 9 0
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	119—123	..	3 13 2
908,300	,,	,,	6	Do. 6 p. c. do	100	164—169	+2	3 11 0
3,800,000	Stck.	12 May	12	Imperial Continental	100	220—224	+2½	5 7 1
75,000	5	15 June	6	Malta & Mediterranean, Ltd.	5	4—4½	..	6 13 4
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p. c. Deb.	100	108—110	..	4 10 11
541,920	20	15 June	5	Monte Video, Limited	20	13½—14½	−½	6 18 0
150,000	5	27 May	10	Oriental, Limited	5	8—8½	..	5 17 8
60,000	5	30 Mar.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited.	10	2—3	..	—
420,000	100	3 May	6	People's Gas of Chicago— 1st Mtg. Bds.	100	105—110	..	5 9 1
500,000	100	1 June	6	2nd Do.	100	100—103	..	5 16 7
150,000	10	15 Oct.	10	San Paulo, Limited	10	8—9	..	—
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	268—273	..	5 13 7
1,350,000	,,	,,	12	Do. B do.	100	222—227	+2	5 5 9
200,000	,,	,,	13	Do. C do.	100	230—240	..	5 8 4
725,000	,,	14 July	5	Do. 5 p. c. Deb. Stk.	100	140—144	..	3 9 6
60,000	Stck.	11 Mar.	11½	Tottenham & Edm'nton, "A"	100	225—230	..	5 0 0
				WATER COMPANIES.				
743,952	Stck.	1 July	10	Chelsea, Ordinary	100	245—250	..	4 0 0
1,720,252	Stck.	13 Apr.	8	East London, Ordinary	100	195—200	..	4 0 0
544,440	,,	1 July	4½	Do. 4½ p. c. Deb. Stk.	100	137—140	..	3 4 3
700,000	50	1 July	8½	Grand Junction	50	100—104	..	4 1 9
708,000	Stck.	12 Feb.	10½	Kent	100	258—263	..	3 19 10
1,043,800	100	1 July	9½	Lambeth, 10 p. c. max.	100	218—223	..	4 5 2
406,200	100	,,	7½	Do. 7½ p. c. max.	100	191—196	..	3 16 7
279,700	Stck.	30 Mar.	4	Do. 4 p. c. Deb. Stk.	100	122—125	..	3 4 0
500,000	100	12 Feb.	12½	New River, New Shares	100	325—335	..	3 22 4
1,000,000	Stck.	28 July	4	Do. 4 p. c. Deb. Stk	100	125—128*	..	3 2 6
902,300	Stck.	15 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	147—152	−1	4 5 6
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	134—138	..	4 14 3
1,155,066	Stck.	15 June	10	West Middlesex.	100	238—243	..	4 2 4

*Ex div.

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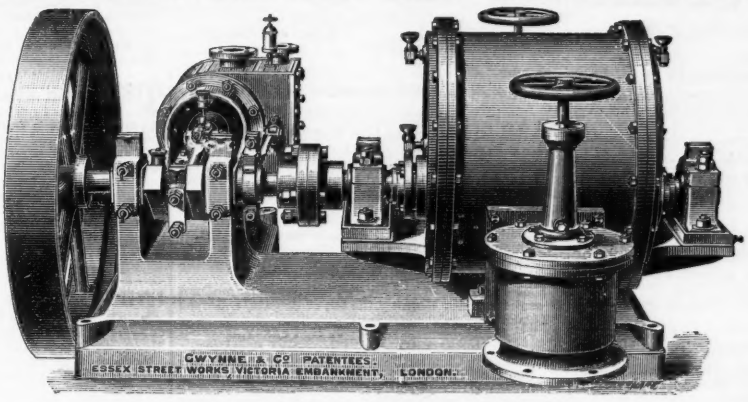

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WANTED, a Second-hand Scrubber, with Connections, for a small Gas-Works.
Particulars and price to H. SMYTHE, Gas Company, MAIDSTONE.

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FOR SALE—A perfectly new 20,000 cubic feet per hour EXHAUSTER, with Steam-Engine combined, including Hydraulic Gas Governor, Bye-Pass Valves, and Connections.
For further particulars, apply to Mr. T. G. MARSH, 41, Corporation Street, MANCHESTER.

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THE Royal Agricultural Hall Company, Limited, Islington, have FOR SALE one 500-LIGHT DRY METER, and one 200-LIGHT DRY METER, which until recently have been used at the Hall, and are in good working order.
Apply to R. VENNER, Secretary, Royal Agricultural Hall Company, Limited, ISLINGTON.

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CONDENSERS, from 500,000 to 10,000 feet per diem.
EXHAUSTERS, from 120,000 to 5000 feet per hour.
STATION METERS, from 100,000 to 1500 ft. per hour.
Would erect any of the above, and make practically equal to new.
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Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

HEYWOOD CORPORATION GAS-WORKS.

TENDERS are invited for Steam Tubes and FITTINGS.
Particulars from Mr. W. Whatmough, Gas Manager.
Tenders to be sent to the undersigned, not later than Five p.m., Tuesday, Aug. 16, 1892.
By order,
ALFRED WALLIS,
Town Clerk.
Municipal Buildings, Heywood,
Aug. 2, 1892.

TENDERS FOR COAL.

THE Eccleshill and Bolton Gas Company invite TENDERS for 2000 tons of GAS COAL, to be delivered at the Railway Station (G.N.R.) in Twelve Months, in such quantities, from time to time, as may be required.
Endorsed tenders must reach me not later than Monday morning, the 8th of August.
J. MELLOR,
Secretary.
Eccleshill, near Bradford,
July 22, 1892.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Corporation invite TENDERS for the supply, in whole or in part, of 30,000 tons of GAS COAL for the year ending Aug. 31, 1893.
Particulars and Form of Tender can be obtained on application to the undersigned, at the Gas-Works.
Tenders, sealed, and endorsed "Tender for Gas Coal," to be sent in not later than Noon of the 25th day of August, 1892, addressed to M. B. Dodds, Esq., Town Clerk, Stockton-on-Tees.
The Gas Committee do not bind themselves to accept the lowest or any tender.
WM. FORD,
General Manager.
Stockton-on-Tees,
Aug. 1, 1892.

TO OXIDE OF IRON MERCHANTS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of 150 tons of OXIDE OF IRON.
Forms of Tender and any other Information may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.
Tenders, sealed and endorsed "Tender for Oxide of Iron," to be sent in to me not later than Five p.m. on Friday, the 5th of August, 1892.
Deliveries to be made within one month of acceptance of tender.
The Corporation do not bind themselves to accept the lowest or any tender.
By order,
ALFRED GILL,
Town Clerk.
Town Hall, Birkenhead,
July 25, 1892.

MORECAMBE GAS AND LIGHT COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 3000 tons of GAS COAL, to be delivered on the Gas-Works Siding, Midland Railway, Morecambe, in such quantities as may be required during the year.
Tenders, specifying the description of the Coal, the name of the Pit at which it is raised, and the terms for net monthly payment, are to be sent on or before Friday, the 12th of August, 1892, endorsed "Tender for Coal."
WILLIAM DUFF,
Secretary and Manager.
Market Street, Morecambe,
July 26, 1892.

SOUTH SHIELDS GAS COMPANY.

TO COAL-OWNERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of 35,000 tons of clean unscreened GAS COAL, for delivery as required from August, 1892, to May, 1893, into Craft and at the Company's Depôt, South Shields.
The Directors reserve to themselves the right of taking the Coal in one or more lots.
The lowest or any tender not necessarily accepted.
Further particulars may be obtained at the Gas-Works, on application to Mr. W. J. Warner, the Engineer.
Sealed tenders, to be delivered to the undersigned not later than Friday Morning, the 5th of August, endorsed "Tender for Coal."
J. H. PENNEY,
Secretary.
Gas Offices, Chapter Row,
South Shields, July 29, 1892.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the SUPPLY of about 40,000 tons of CANNEL and about 160,000 tons of best GAS COALS (screened or nuts). Price per ton to be quoted, delivered at their Gas-Works, Meadow Lane (Hunslet Lane Siding), New Wortley (Gelderd Junction Siding), or at the Gas-Works, York Street, in such quantities as may be required.
The contract to commence the 1st of October next, and terminate the 30th of June, 1893.
Forms of Tender may be obtained on application to Mr. Lupton, General Superintendent, Gas Department, Municipal Offices, Calverley Street.
Tenders may be for any portion of the total quantity required, and will be received not later than Wednesday, the 17th of August next, addressed to the Chairman of the Gas Committee, Municipal Offices, Calverley Street, and endorsed "Tender for Coal."
The lowest or any tender will not necessarily be accepted.

BOROUGH OF ROCHDALE.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation invite TENDERS for the supply of 40,000 tons of COAL per annum for a period of One or Two Years, commencing on the 1st of September next.
The Coal offered must be screened Coal or Nuts, free from Bats, Bind, Refuse, or Dirt.
Forms of Tender and any further Particulars may be obtained on application to Mr. T. B. Ball, the Manager at the Gas-Works.
Tenders, stating price per ton delivered at the Rochdale Station, and endorsed "Coal," must be sent to me not later than Noon of Wednesday, the 10th of August, 1892.
By order,
ZACH. MELLOR,
Town Clerk.
Town Hall, Rochdale,
July 30, 1892.

TENDERS FOR GAS COAL.

THE Directors of the Sunderland Gas Company are prepared to receive TENDERS for GAS COALS (in lots of 5000 tons and upwards), to be delivered by Rail on the Company's Sidings at Hendon, or Ayre's Quay Gas-Works, in such Monthly proportions, from Sept. 1, 1892, to June 30, 1893, as the make of Gas may render necessary.
The Coals to be clean, dry, and fresh worked.
Tenders, endorsed "Tender for Gas Coals," specifying the description of Coals, the name of the Pit, and the particular Seam from which the Coal is to be supplied, to be left at the Offices of the Company, Borough Road, Sunderland, on or before Ten a.m. on Tuesday, Aug. 9.
Short weight or inferior quality to be allowed for.
The Company do not bind themselves to accept the lowest or other tender until after a satisfactory trial of the Coals to which such tender may relate shall have been made.
J. H. COX,
Secretary.
Sunderland, July 30, 1892.

TENDERS FOR GAS COAL.

THE Directors of the Slough Gas and Coke Company are prepared to receive TENDERS for the supply of 1000 to 2000 tons of either of the undermentioned GAS COALS (screened or unscreened), viz.:—
HOLMSIDE,
EAST PONTOP,
NEW PELTON, or
ALDWARKE MAIN,
to be delivered at the Slough Station of the Great Western Railway, or the Slough Terminus of the Grand Junction Canal, in the usual monthly quantities, as may be required, during a period of One Year from August, 1892.
Payment for Coals on or before the 20th of the following month after delivery.
Tenders to be delivered to the undersigned, endorsed "Tender for Gas Coal," on or before Tuesday, the 9th day of August next.
The Directors do not bind themselves to accept the lowest or any Tender.
ARTHUR THOMAS,
Secretary.
Slough, Bucks, July 27, 1892.

HEALTH EXHIBITION, New Drill Hall, Portsmouth, including Sanitary Apparatus and Appliances, Arrangements for Water Supply, Heating and Cooking Apparatus, Electric Lighting, Smoke-Preventing Appliances, Articles relating to Personal Hygiene, Domestic Economy, Foods, Clothing, Life and Labour Saving Appliances, &c., to be held from Sept. 12 to Oct. 8, 1892, in connection with the Autumn Congress of the Sanitary Institute.
Prize Medals and Certificates of Merit will be awarded for approved exhibits.
Forms of Application for Space and all Particulars can be obtained from the CURATOR, Mr. W. H. Knight, 74a, Margaret Street, LONDON, W.

GAS COALS.

TENDERS are invited for the supply of 700 tons of best GAS COALS, to be delivered at the Great Eastern Railway Station, in such quantities as may be required, over a period of One Year.
Quotations to specify if Coals are screened or unscreened.
The Coals to be fresh wrought, and free from Pyrites, Bats, Smudge, and other objectionable matter.
The lowest or any tender need not be accepted.
WILLIAM J. BEST,
Manager.
St. Ives (Hunts.) Gas Company, Ltd.,
July 27, 1892.

THE Directors of the Sandwich Gas Company invite TENDERS for the supply and delivery of 600 tons of NEW PELTON, HEBBURN MAIN, and other GAS COALS in the following quantities and dates, viz.:—
150 tons middle of September, 1892.
150 " " November, "
150 " " January, 1893.
150 " " March, "
Tenders to be sent in by August 8, 1892, addressed to W. MAY, Esq., Chairman.
J. LATCHFORD,
Manager.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of One Year from the 1st of September next.
All particulars, with form of Tender, may be had from the undersigned.
Sealed tenders, endorsed "Tar," and addressed to J. Thorp, Esq., Chairman, to be delivered at the Town Hall, Leigh, on or before Monday, the 15th of August next.
The highest or any tender not necessarily accepted.
ALFRED T. FLETCHER,
Engineer and Manager.
Gas-Works, Leigh,
Lancashire, July 30, 1892.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Guildhall Tavern, Gresham Street, in the City of London, on Friday, the 26th day of August next, at half-past Twelve o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last, to declare a dividend, and to transact the General Business of the Company.
The Transfer Books will be closed from the 13th to the 26th of August, both inclusive.
By order of the Board,
ALFRED LASS,
Secretary.
Offices: 30, Gracechurch Street, London.
July 29, 1892.

Price 6s., Cloth Bound, Bevelled Boards.

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AND OTHER PAPERS

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TO COAL OWNERS.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for the supply of 1,500,000 tons, more or less, of COAL, for a period of Ten months from the 1st day of September next, in accordance with the terms of their Specifications.

Deliveries can be made either by Ship in the Thames or by the principal Lines of Railway, which are in connection with the several Works of the Company.

Copies of the Specifications and Forms of Tender can be obtained upon application at this Office; and all tenders must be sent in before Noon on Wednesday, the 3rd of August, addressed to me, and endorsed "Coal Tender."

By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 13, 1892.

WEST MALLING GAS COMPANY.

TENDERS FOR GAS COAL.

TENDERS are invited for the supply of about 550 tons (more or less) of PELTON MAIN or any other class of really good GAS COAL, to be delivered at the Company's Works, West Malling, between the 29th day of September, 1892, and the 29th day of September, 1893, in quantities of not more than 50 tons a month.

The name and quality of the coal to be specified in the tender.

Terms: Payments quarterly.

Sealed tenders, endorsed "Tender for Coal," to be forwarded to the Secretary, on or before Thursday, the 11th day of August next.

The Directors do not pledge themselves to accept the lowest or any tender.

By order,
HENRY D. WILDES,
Secretary.

West Malling,
July 18, 1892.

UXBRIDGE & HILLINGDON GAS CONSUMERS' COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the ensuing Twelve Months from the 1st of September next.

The quantity of Tar will be about 35,000 gallons, and the quantity of Liquor will be between 800 and 900 butts, both of which will be delivered free into Contractor's Barges alongside the Works, on the Grand Junction Canal.

Tenders, endorsed for Tar or Liquor (as the case may be), must be addressed to the Chairman, and be delivered at the Company's Offices, High Street, Uxbridge, not later than Saturday evening, Aug. 6.

The Company have no special form of tender; but it is suggested that the Tar should be tendered for at so much per gallon, and the Ammoniacal Liquor at so much per ounce per butt—the strength being ascertained by Wills's distillation test.

The Directors do not bind themselves to accept the highest or any tender.

Further particulars may be obtained of the undersigned.

S. PENNY, Assoc.M.Inst.C.E.,
Engineer and Manager.

Uxbridge, Middlesex,
July 22, 1892.

THE GASLIGHT AND COKE COMPANY.

NOTICE is hereby given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at this Office, on Friday, the 5th day of August next, at Twelve o'clock Noon precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ending on the 30th day of June last.

Notice is hereby also given, that at such meeting the Directors will apply to the Proprietors for authority, in pursuance of the powers of the Company's Act of 1876, to raise further Capital by the creation and issue of a sum not exceeding £150,000 of New Ordinary Stock.

By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 20, 1892.

NORTH OF IRELAND
ASSOCIATION of GAS MANAGERS

THE
ANNUAL MEETING
Of this Association
WILL BE HELD IN THE
EXHIBITION ROOM
OF THE
ALLIANCE GAS COMPANY,
HAWKINS STREET (next Leinster Hall), DUBLIN,
ON TUESDAY, AUG. 9, 1892.

The Chair to be taken at 12 Noon, by the Vice-President, Mr. W. S. STORMONTH, of Coleraine.

The business will consist of the Inaugural Address; Papers by Messrs. Robb and Salmon; a description and exhibition of his High-Power Lighthouse Burner, by Mr. J. R. Wigham; and a Lecture on the "Chemical Properties of Coal Gas," by Professor C. R. Tichborne, LL.D., F.C.S. An opportunity will be afforded for visiting the Dublin Gas-Works and the Howth Lighthouse.

The Members will dine together in Jury's Hotel, College Green, at Four p.m. Tickets, 4s. each, to be had from the Secretary. *It is important* that Dinner Tickets should be secured *not later than the 5th of August.*

The cordial co-operation of all Irish Gas Managers is earnestly requested by the Committee; and the Secretary will be glad to receive the names of any gentlemen intending to be present or to join the Association.

JAMES WHIMSTER,
Hon. Secretary.

Gas-Works, Armagh, July 23, 1892.

ALEXANDER RUSSELL & CO.,
Cannel and Gas Coal Merchants,
53, WATERLOO STREET,
GLASGOW.

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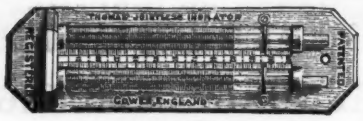

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AND
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Manufacture and keep in Stock at their Works (also large stock in London)
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Retort Setters sent to any part of the Kingdom.

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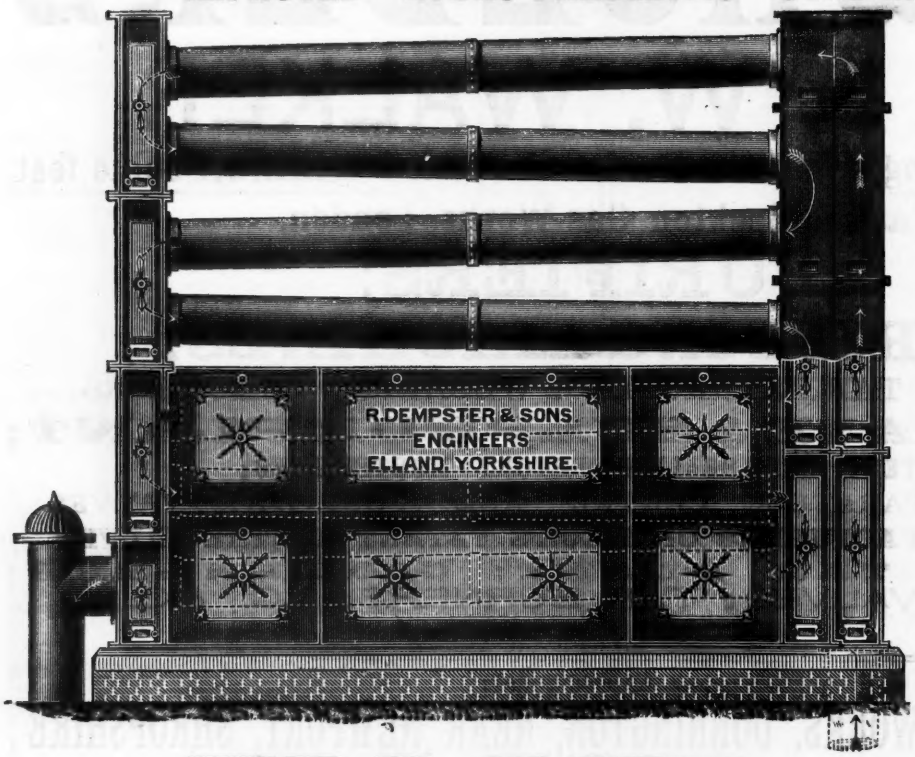
ESTABLISHED 1855.
IMPROVED HYDRO-PNEUMATIC CONDENSER.



With this Condenser the Gas is cooled in a most regular and gradual manner, and forms one of the most powerful and efficient means of Condensing. The facility offered for Controlling its effectiveness according to the quantity of Gas made or the Temperature of the Atmosphere, will commend itself to all Engineers and Managers. By means of Counterbalanced Wing Valves, any series of Tubes may be thrown out of action, the Water-Tank easily emptied or filled as desired, and the flow of cold Water through the Tank regulated at will.

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Improved Slide-Valve Anti-Dip.

Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.
Is cheap and easily fixed to any form of main.
Will be found the most efficient appliance of the kind yet introduced.
Further particulars and price from

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OLDBURY, BIRMINGHAM.
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Prices and Analysis on application.
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Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.
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PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16¼ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, the Ipswich Gas Company, and by many other Gas Companies both at Home and Abroad.

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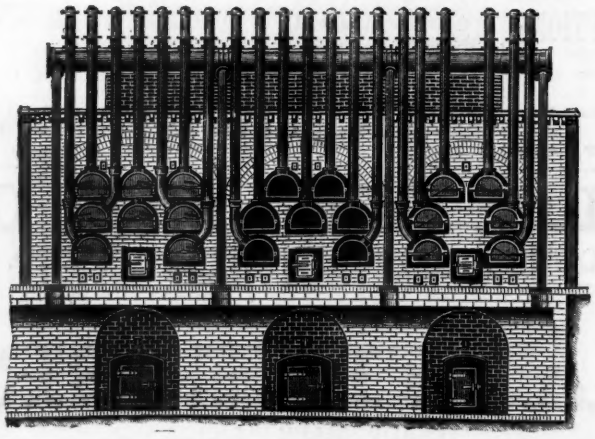

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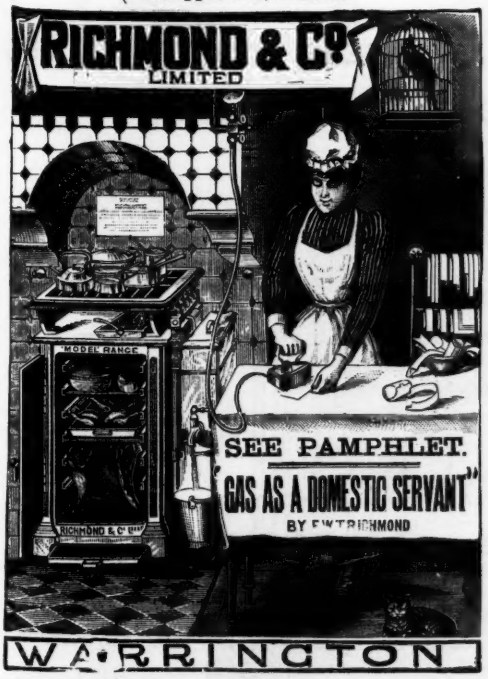

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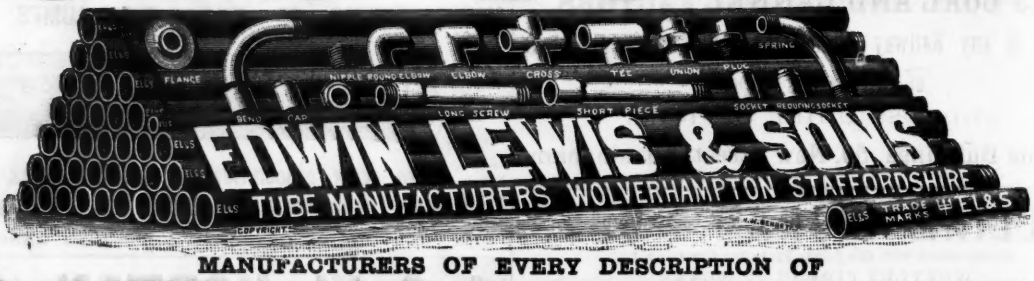

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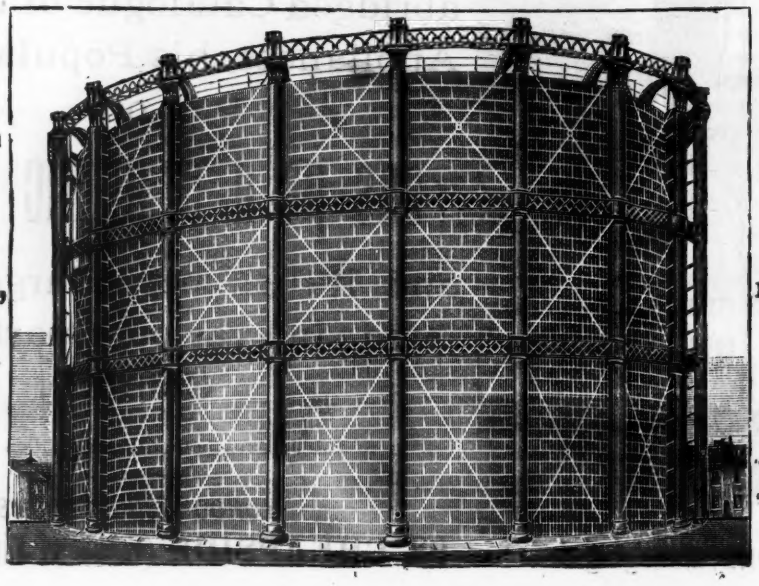

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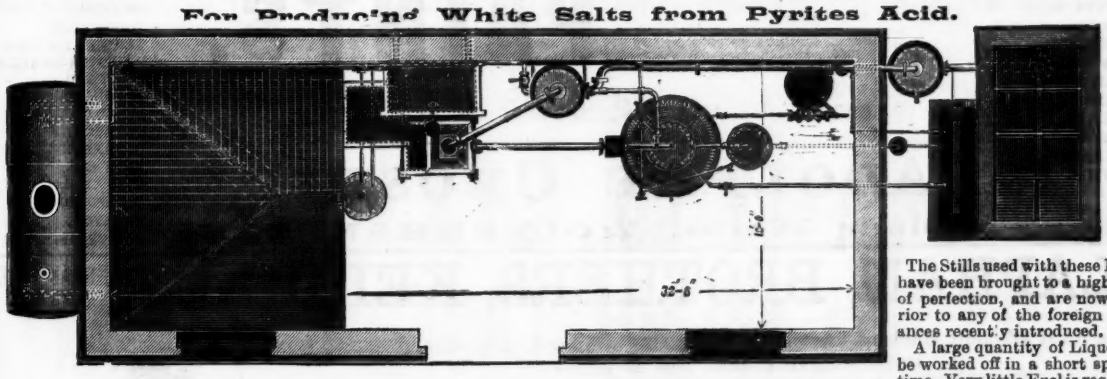

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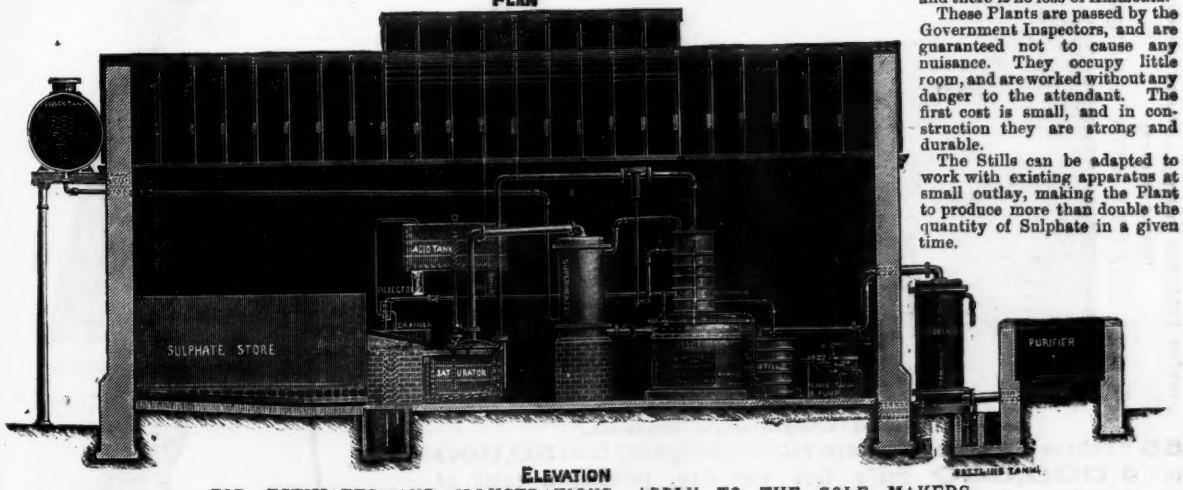

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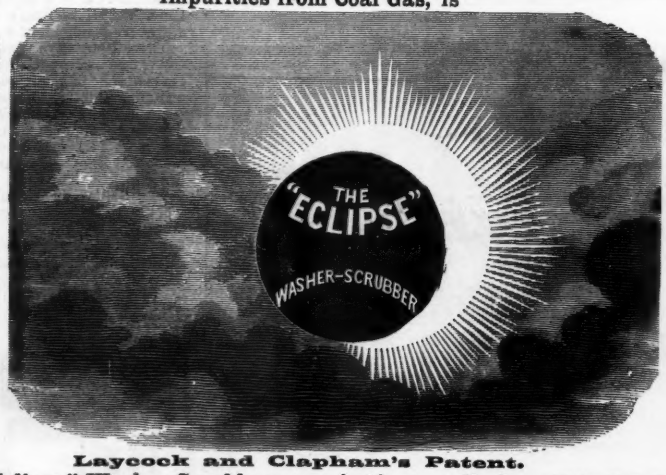

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